VPDES PERMIT FACT SHEET

This document gives pertinent information concerning the **reissuance** of the VPDES permit listed below. This permit is being processed as a **Major, Municipal** permit. The effluent limitations contained in this permit will maintain the Water Quality Standards of 9 VAC 25-260-00 et.seq.

This discharge is into Middle Fork Holston River resulting from the operation of a 3.4 MGD wastewater treatment plant which provides: primary treatment: influent pump station, dual manually cleaned bar screen and one mechanical self-cleaning filter screen; one manually cleaned and one mechanically cleaned aerated grit removal chamber; dual primary clarifiers; secondary treatment: dual activated bio-filters, four aeration basins, and dual secondary clarifiers; disinfection: ultraviolet light; post-aeration: dual aeration tanks with diffusers; flow measurement: Parshall flume/ultrasonic flowmeter; sludge treatment: described in Item #10 below; other: non-potable water pumps and system, froth control pumps, polymer feed system for belt press, and fully equipped laboratory. See attachment A for more detailed description. This permit action consists of limiting pH, BOD_5, suspended solids, total residual chlorine, ammonia nitrogen, E.coli and dissolved oxygen; including special conditions regarding biosolids use and disposal, biosolids limitations and monitoring requirements and soil monitoring requirements for land application sites; compliance reporting, pretreatment program implementation, toxics management program, and other requirements and special conditions.
SIC Code: 4952

1. Facility Name and Address:
Town of Marion Wastewater Treatment Plant
1580 Daisy Lane
Marion, VA 24354

2. **Permit No. VA0086304**
(Previous) Effective Date: July 12, 2006
(Previous) Expiration Date: July 11, 2011

3. Owner Name and Address:
Town of Marion
P.O. Box 1005
Marion, VA 24354

Owner Contact:
Mr. John E.B. Clark, Jr.
Title: Town Manager
Telephone No: 276-783-4113

Facility Contact:
Name: Douglas L. Teaster
Title: Chief Operator
Telephone No: 276-782-8495

4. Application Complete Date: ~~February 8, 2011~~ 04/14/2011 (SMW)
Permit Drafted By: Fred M. Wyatt, SWRO Date: January 31, 2011
Reviewed By: Steve Guilfoyle Date: 2/28/11
Public Comment Period Dates: from 04/16/2011 to 05/16/2011

5. Receiving Stream Name: Middle Fork Holston River; River Mile: 6CMFH039.58; Basin: Tennessee-Big Sandy River; Subbasin: Holston River; Section: 5; Class: IV; Special Standards: None. Lat.: 36°49'21" ; Long.: 81°33'08"

7-Day, 10-Year Low Flow (7Q10): 11.9 MGD (June - Nov.)
1-Day, 10-Year Low Flow (1Q10): 9.3 MGD (June - Nov.)

7Q10 High Flow: 14.5 MGD (Dec. - May)
1Q10 High Flow: 12.5 MGD (Dec. - May)
30-Day, 10-Year Low Flow (30Q10): 17.7 MGD (June - Nov.)
30Q10 High Flow: 36.4 MGD (Dec. - May)

Tidal? No

303(D) list? Yes (See Item # 13 below)

6. Operator License Requirements: Class II

7. Reliability Class: II

8. Permit Characterization:
( ) Private ( ) Federal ( ) State (X) POTW ( ) PVOTW
( ) Possible Interstate Effect ( ) Interim Limits in Other Document

9. Attach a schematic of and provide a brief description of the wastewater treatment system.

Discharge Description

OUTFALL NUMBER	DISCHARGE SOURCE (1)	TREATMENT (2)	DESIGN FLOW (3)
001	Town of Marion and surrounding sections of Smyth County	See Page 1 above, first paragraph	3.4 MGD

10. Sewage Sludge

Sewage Sludge Treatment Process: Approximately 150 dry metric tons of sludge are produced at this facility each year. Sludge treatment consists of: dual sludge return pumps, gravity sludge thickener, one primary and one secondary anaerobic digester; and belt filter press for sludge dewatering.

Since the land application of biosolids has been chosen as the disposal method on the VPDES Sewage Sludge Permit Application Form, permit limits and monitoring requirements are necessary based on the VPA Permit Regulation (9VAC25-32 Sections 310 through 760) and the VPDES Permit Regulation (9VAC25-31 Sections 420 through 720), and 40 CFR Part 503.

Pathogen Reduction and Vector Attraction Reduction: The sewage treatment works must achieve the following treatment standards:

a. Class B pathogen reduction by one of the applicable reduction alternatives specified in 9VAC25-31-710.
b. Vector attraction reduction by one of the applicable alternatives specified in 9VAC25-31-720.

The permit authorizes the land application of biosolids to three fields on the Scott Waddle Farm in Smyth County and to four fields on the William S. Meek Farm in Smyth County, consisting of *170.5* gross acres.

Site	Owner	Description	Acreage (acres)	County
S01	William S. Meek	Field # 12	11.6	Smyth
S02	William S. Meek	Field # 13	11	Smyth
S03	William S. Meek	Field # 18	19	Smyth
S04	William S. Meek	Field # 19	21	Smyth
S05	Scott Waddle	Area A	27.4	Smyth
S06	Scott Waddle	Area B	39.4	Smyth
S07	Scott Waddle	Area C	41.1	Smyth

Biosolids Characterization: The attached sludge analyses indicate that all metals concentrations in the sludge are less than the Ceiling Concentration Limits presented in Table 1 of the permit regulation (9VAC25-31-540). Therefore, the sludge meets the land application requirement for the Pollutant Concentration Option (Table 3, 9VAC25-31-540) and may only be applied in bulk.

Table A
LIMITATIONS AND MONITORING REQURIEMENTS FOR POLLUTANT CONCENTRATIONS BIOSOLIDS (PC BIOSOLIDS):

PARAMETER	BASIS FOR LIMITS	MONITORING REQUIREMENTS			
		Maximum[a]	Monthly[b]	Frequency[c]	Sample Type
Total Arsenic (mg/kg)	1,2,3,4,5	75	41	1/Year	Composite
Total Cadmium (mg/kg)	1,2,3,4,5	85	39	1/Year	Composite
Total Copper (mg/kg)	1,2,3,4,5	4,300	1,500	1/Year	Composite
Total Lead (mg/kg)	1,2,3,4,5	840	300	1/Year	Composite
Total Mercury (mg/kg)	1,2,3,4,5	57	17	1/Year	Composite
Total Molybdenum (mg/kg)	1,2,3,4	75	NA	1/Year	Composite
Total Nickel (mg/kg)	1,2,3,4,5	420	420	1/Year	Composite
Total Selenium (mg/kg)	1,2,3,4,5	100	100	1/Year	Composite
Total Zinc (mg/kg)	1,2,3,4,5	7,500	2,800	1/Year	Composite
Percent Solids (%)	1,2,3	NA	NL	1/Year	Composite
Volatile Solids (%)	1,2,3	NA	NL	1/Year	Composite
TKN (mg/kg)	1,2,3	NA	NL	1/Year	Composite
Ammonium Nitrogen (mg/kg)	1,2,3	NA	NL	1/Year	Composite
Nitrate Nitrogen (mg/kg)	1,2,3	NA	NL	1/Year	Composite
Total P (mg/kg)	1,2,3	NA	NL	1/Year	Composite
Total K (mg/kg)	1,2,3	NA	NL	1/Year	Composite
pH (SU)	1,2,3	NA	NL	1/Year	Composite
CCE as $CaCO_3$ (%)	1,2,3	NA	NL	1/Year	Composite

NL = No Limitation, monitoring required
NA = Not Applicable

a. If the concentration of any metal in Table A above exceeds the maximum concentration, for any single sample of biosolids, then the biosolids *shall not* be land applied.

b. If the concentration of any metal in Table A above exceeds the monthly average concentration but is less than the maximum concentration, the cumulative loading of the metals must be tracked. See *Cumulative Pollutant Loading Rate Limitations Table below.*

c. If the annual amount of biosolids produced at the facility exceeds 290 dry metric tons the facility shall increase the sampling to the monitoring frequency listed below:

Amount of biosolids (dry metric tons per 365-day period)	Frequency
Greater than zero but less than 290	Once per year
Equal to or greater than 290 but less than 1,500	Once per quarter (four times per year)
Equal to or greater than 1,500 but less than 15,000	Once per 60 days (six times per year)
Equal to or greater than 15,000	Per month (12 times per year)

Bases for Effluent Limitations

1. 9VAC25-31-570
2. 9VAC25-31-490
3. 9VAC25-31-560
4. 9VAC25-31-540, Table 1
5. 9VAC25-31-540, Table 3

Table B
Cumulative Pollutant Loading Rate Limitations (CPLR) Biosolids:

PARAMETER	BASIS FOR LIMITS	LIMITATIONS		MONITORING REQUIREMENTS	
		CPLR[a]		Frequency[b]	Sample Type
		(kg/ha)	(lb/A)		
Total Arsenic (mg/kg)	1	41	36	Each Application	Calculated
Total Cadmium (mg/kg)	1	39	35	Each Application	Calculated
Total Copper (mg/kg)	1	1,500	1,340	Each Application	Calculated
Total Lead (mg/kg)	1	300	270	Each Application	Calculated
Total Mercury (mg/kg)	1	17	16	Each Application	Calculated
Total Nickel (mg/kg)	1	420	375	Each Application	Calculated
Total Selenium (mg/kg)	1	100	89	Each Application	Calculated
Total Zinc (mg/kg)	1	2,800	2,500	Each Application	Calculated

a. Cumulative Pollutant Loading Rates must be tracked *only* if the monthly average concentrations for the metals listed in Table B above are exceeded.

b. Samples shall be collected prior to each land application activity.

Bases for Effluent Limitations

1. 9VAC25-31-540, Table 2

Unless otherwise stated, all biosolids parameters are reported on a dry weight basis

Table C
Soils Monitoring Requirements for each Land Application Field:

PARAMETER	BASIS FOR LIMITS	LIMITATIONS	MONITORING REQUIREMENTS	
			Frequency[c]	Sample Type[d]
Soil pH[a] (SU)	1,2	NL	Prior to Application	Composite
Cation Exchange Capacity (meq/100 g)	1,2	NL	Prior to Application	Composite
Available Phosphorus[b] (mg/kg)	1,2	NL	Prior to Application	Composite
Exchangeable Potassium (mg/kg)	1,2	NL	Prior to Application	Composite
Exchangeable Magnesium (mg/kg)	1,2	NL	Prior to Application	Composite

NL = No Limitation, monitoring required

a. 9VAC25-32-560.B.3.a. Lime amended biosolids shall be applied at rates that are not expected to result in a target soil pH in the plow layer above a pH of 6.5 for soils located in the coastal plain and above a pH of 6.8 in other areas of the state.

b. 9VAC25-32-660. If soils exhibit very high soil test phosphorus of 55 or more parts per million phosphorus (Mehlich I analytical test procedure or equivalent procedure approved by the Department of Conservation and Recreation), the maximum application rates for phosphorus contained in biosolids together with phosphorus contained in other applied nutrient sources to the site and all applicable phosphorus management practices shall be consistent with the nutrient management plan (prepared by a certified nutrient management planner as stipulated in regulations promulgated pursuant to §10.1-104.2 of the Code of Virginia).

c. Soil samples shall be collected prior to biolsolids application and analyzed no more than 3 years prior to the application. For biosolids with a cadmium concentration greater than or equal to 21 mg/kg the soil pH sample must be less than 1 year old.

d. Soil composite samples shall be representative of soil types delineated by the SCS Soil Survey (or the equivalent). Samples shall be taken at 0-6 inches soil depth for each land applications site. Soil testing used to develop a Nutrient Management Plan must be conducted by a DCR approved laboratory in accordance with the Virginia Nutrient Management Standards and Criteria.

Bases for Effluent Limitations

1. 9VAC25-32-460
2. 9VAC25-32, Table 5

Land Area Determination:
Nutrients: All nutrient loading issues are addressed in the Nutrient Management Plan. (*See Special Conditions*).

11. Discharge Location Description: See attached Marion VA Quadrangle; Number: 056D

12. Material Storage: None reported

13. Ambient Water Quality Information: This segment of Middle Fork Holston River is impaired. The segment is not supporting the recreation use goal. The impairment is listed as Escherichia coli. The sources are rural (residential areas) and unrestricted cattle access. A bacteria TMDL was approved by EPA on 04/12/2010 and by EPA on 12/09/2010. The Town of Marion WWTP is in compliance with the bacterial (E.coli) wasteload allocation in the TMDL.

14. Antidegradation Review & Comments: Tier I (X) Tier II Tier III
The State Water Control Board's Water Quality Standards includes an antidegradation policy (9 VAC 25-260-30). All state surface waters are provided one of three levels of antidegradation protection. For Tier 1 or existing use protection, existing uses of the water body and the water quality to protect these uses must be maintained. Tier 2 water bodies have water quality that is better than the water quality standards. Significant lowering of the water quality of Tier 2 waters is not allowed without an evaluation of the economic and social impacts. Tier 3 water bodies are exceptional waters and are so designated by regulatory amendment. The antidegradation policy prohibits new or expanded discharges into exceptional waters. The antidegradation review begins with a Tier determination. Since the receiving stream is listed on the 303(D) Report as impaired, it is considered as Tier I.

15. Site Inspection: Technical Inspection on 6/18/2010 by Wade Carico.

16. Effluent Screening & Limitation Development: The BOD^5 and dissolved oxygen effluent limitations were calculated in 1990 by using a Streeter-Phelps wasteload allocation model. The ammonia nitrogen effluent limitations were originally calculated using the existing statistical model and stream standards in 1990. At the permit reissuance in 1996, the limits were recalculated, based on new stream flow data.

Basis for Effluent Limitations: 3.4 MGD WWTP

PARAMETER	BASIS FOR LIMITS *	DISCHARGE LIMITS				MONITORING REQUIREMENTS	
		MONTHLY AVERAGE	WEEKLY AVERAGE	MINIMUM	MAXIMUM	FREQUENCY	SAMPLE TYPE
Flow	NA	NL	NA	NA	NL	Continuous	Totalizing & Recording
PH	2	NA	NA	6.0 SU	9.0 SU	1/Day	Grab
$CBOD_5$	1,5	25 mg/l 320 kg/d	38 mg/l 480 kg/d	NA	NA	1 Day/Week	24 Hour Composite
Total Suspended Solids	1	30 mg/l 390 kg/d	45 mg/l 580 kg/d	NA	NA	1 Day/Week	24 Hour Composite
Ammonia Nitrogen	2,5	3.6 mg/l	4.4 mg/l	NA	NA	1 Day/Week	24 Hour Composite
E.coli	2	126 n/100 ml**	NA	NA	NA	3/Week @ 48 Hr. Inter.***	Grab
Dissolved Oxygen	2,5	NA	NA	6.0 mg/l	NA	1/Day	Grab
Chronic Toxicity Units	2	NA	NA	NA	NL TU_C	1/Year	24 Hour Composite

*1. Federal Effluent guidelines
2. Water Quality-based Limits
3. Best Engineering Judgment
4. Best Professional Judgment
5. Other (e.g wasteload allocation model)

** Geometric Mean

*** Between 10 a.m. and 4 p.m.

17. Sludge Use and Disposal
See Items 10 and 20

18. Antibacksliding Statement: Since the effluent limitations are not being altered, the antibacksliding provisions of the Permit Regulation (9 VAC 25-31-220.1) do not apply.

19. Compliance Schedules: None

20. Special Conditions:

PART I.B. Compliance Reporting
Rationale: Authorized by VPDES Permit Regulation, 9VAC25-31-190J4 and 220 I. This condition is necessary when pollutants are monitored by the permittee and a maximum level of quantification and/or a specific analytical method is required in order to assess compliance with a permit limit or to compare effluent quality with a numeric criterion. The condition also establishes protocols for calculation of reported values.

PART I.C. Special Condition - Pretreatment Program Implementation
Rationale: VPDES Permit Regulation, 9VAC25-31-730 through 900, and 40 CFR part 403 require certain existing and new sources of pollution to

meet specified regulations.

PART I.D. Special Condition - Whole Effluent Toxicity Testing
Rationale: VPDES Permit Regulation, 9VAC25-31-210 and 220I, requires monitoring in the permit to provide for and assure compliance with all applicable requirements of the State Water Control Law and the Clean Water Act.

PART I.E. Biosolids Land Application Special Conditions

1. Sludge Use and Disposal (Part I.E.1)
Rationale: VPDES Permit Regulation, 9VAC25-31-100 P; 220 B 2; and 420 through 720, and 40 CFR Part 503 require all treatment works treating domestic sewage to submit information on sludge use and disposal practices and to meet specified standards for sludge use and disposal.

2. Sludge Reopener (Part I.E.2)
Rationale: Required by VPDES Permit Regulation, 9VAC25-31-220 C 4, for all permits issued to treatment works treating domestic sewage.

3. Nutrient Management Plan Requirement: (Part I.E.3)
Rationale: State Water Control Law § 62.1-44.19.3.C.8 requires that a NMP be developed by a person certified in accordance with § 10.1-104.2 for each biosolids land application site, prior to application of biosolids at the site. The statute also establishes conditions where the NMP must be approved by the Department of Conservation and Recreation prior to submittal at the time of permit application.

4. Loading Rates: (Part I.E.4)
Rationale: 9VAC25-31-505.A - Site specific nutrient management plans and the cumulative trace element loading rates (9VAC25-32-540 Table 2) 9VAC25-31-220.I.4.a. states that mass or other measurements for each pollutant of concern may be specified in the VPDES Permit. 9VAC25-31-220.I.4.c. allows for other measurements as appropriate.

5. 14 Day Notification: (Part I.E.5)
Rationale: State Water Control Law § 62.1-44.19.3.L. and 9VAC25-31-485.D. require notification to the Department 14 days prior to land application at a specific site.

6. Signage Requirements: (Part I.E.6)
Rationale: 9VAC25-32-530.B. requires a sign be posted at a land application site at least 48 hours prior to delivery of biosolids at the site and remain on site until 48 hours after application is complete. 9VAC25-32-530.C-D specifies construction, content and maintenance of the sign.

7. 100 Day Notification to the Locality: (Part I.E.7)
Rationale: 9VAC25-31-485.C. requires notification to the locality 100 days prior to the initial land application at a specific site.

8. Certified Land Applicator Requirement: (Part I.E.8)
Rationale: State Water Control Law § 62.1-44.19.3.1.B. states that Class B biosolids shall not be land applied unless a certified land applicator is onsite at all times during the application.

9. Threatened or Endangered Species: (Part I.E.9)
Rationale: 9VAC25-31-550.A requires that land application of biosolids in accordance with the regulations is not to result in harm to threatened or endangered species listed in 9VAC25-260-320 nor result in the destruction or adverse modification of the critical habitat of a threatened or endangered species.

10. Infrequent Application: (Part I.E.10)
Rationale: 9VAC25-32-560.B.3.a(1) specifies requirements for infrequent application.

11. Frequent Application Below Agronomic Rate: (Part I.E.11)
Rationale: 9VAC25-32-560.B.3.a(5) specifies requirements for frequent, below agronomic rate application.

12. Liquid Application Rate Limitation: (Part I.E.12)
Rationale: 9VAC25-32-560.B.3.c(1) specifies requirements for application of liquid biosolids.

13. Operational Limitations During Periods of Inclement Weather (Part I.E.13)
Rationale: 9VAC25-31-505.A - NMP specifies requirements for application during inclement weather.

14. Injection or Incorporation Requirements: (Part I.E.14)
Rationale: 9VAC25-32-560.B.3.b. requires direct injection or incorporation within 48 hours of application on sites with less than 60% uniform residue cover or at times when the site is subject to frequent flooding as defined by soil survey information.

15. Slope Restrictions: (Part I.E.15)
Rationale: 9VAC25-32-560.B.3.b.c. specifies maximum slope restrictions and management practices to follow when applying on fields with slopes between 5% and 15%.

16. Buffer Zones: (Part I.E.16)
Rationale: 9VAC25-32-560.B.3.d(1) establishes setback distances.

17. Transport Vehicles: (Part I.E.17)
Rationale: 9VAC25-32-540.A. requires that vehicles transporting biosolids be sealed and watertight if carrying liquid biosolids.

18. Soil pH and Cadmium: (Part I.E.18)

Rationale: 9VAC25-32-560.B.2. requires that the biosolids/soil mixture have a final pH of 6.0 S.U. or greater if the soil cadmium concentration is greater than 21 mg/kg.

Rationale: 9VAC25-32-560.B.2. requires that the biosolids/soil mixture have a final pH of 6.0 S.U. or greater if the soil cadmium concentration is greater than 21 mg/kg.

19. Landowner Consent and Notice: (Part I.E. 19)
Rationale: 9VAC25-32-60.A.1.d. requires the submission of landowner consent forms. 9VAC25-32-80.H.2. requires the consent forms to be maintained for a minimum of 5 years or for the duration of the permit. 9VAC25-32-530.A. requires the permittee to maintain the agreement.

20. Site Restrictions for Land Application of Class B Biosolids: (Part I.E.20.)
Rationale: 9VAC25-31-710.B.5. requires restricted access for sites based on type of food crops, grazing livestock and human access.

21. Depth to Water Table: (Part I.E.21)
Rationale: Required for biosolids based on 9VAC25-32-560.B.2.

22. Depth to Bedrock: (Part I.E.22)
Rationale: Required for biosolids based on 9VAC25-32-560.B.2.

23. Restrictions for CPLR Biosolids Application: (Part I.E.23)
Rationale: 9VAC25-32-640 establishes maximum cumulative pollutant loading of trace elements on soils.

24. Restrictions for CPLR Biosolids Application to Sites Previously Used: (Part I.E.24)
Rationale: 40 CFR Part 503.12(e)(2)(i-iv), which applies to all biosolids applied in the USA, establishes July 20, 1993 as the date to begin accounting for pollutant loading to soils.

25. CPLR Biosolids Tracking: (Part I.E.25)
Rationale: Required in order to comply with Part I.G.24.

26. Recordkeeping for PC and CPLR Biosolids: (Part I.E.26)
Rationale: 9VAC25-31-190.J.2. requires the maintenance of all biosolids monitoring and reporting records for at least 5 years.

27. Additional Recordkeeping for CPLR Biosolids: (Part I.E. 27)
Rationale: 9VAC25-31-580.A.5. requires the maintenance of all biosolids monitoring and reporting records for at least 5 years. Items g through m are required indefinitely in order to comply with Part I.D.24, as identified in 40 CFR Part 503.17(2).

28. Reporting Land Application of Biosolids Upon Attaining 90% of CPLR: (Part I.E.28)
Rationale: 40 CFR Part 503.18(2), which applies to all biosolids applied in the USA, requires this reporting.

Part F. Special Condition - Biosolids Reporting Requirements

1. Monitoring Report: (Part I.F.1)

Rationale: 9VAC25-31-590 states that biosolids monitoring is to be submitted annually unless otherwise required.

2. Monthly Activity Report: (Part I.F.2)
Rationale: 9VAC25-32-440-B and Fee Regulation 9VAC25-20-147.B require submittal of a report by the 15th of the month following the month in which land application occurred.

3. Land Application Fee: (Part I.F.3)
Rationale: State Water Control Law § 62.1-44.19.3.P. requires that a fee be charged to the generator of biosolids to be land applied in Virginia. The fee of $7.50/dry ton of biosolids applied in the Commonwealth of Virginia is established by the Fee Regulation 9VAC25-20-146 and 9VAC25-20-40 A.3. Exemptions to the fee are provided in 9VAC25-20-50.C. 9VAC20-60.D establishes the due date.

4. Annual Report: (Part I.F.4)
Rationale: 9VAC25-31-590 requires the submittal of an annual report postmarked by February 19th for the previous year.

5. Records Retention: (Part I.F.5)
Rationale: 9VAC25-31-580 specifies that all records of biosolids activities, monitoring and reporting shall be maintained for at least 5 years.

PART G. Biosolids Storage Special Conditions:

1. Storage Regulatory Basis: (Part I.G.1)
Rationale: Requirements pursuant to § 62.1-44.19.3.R. of the Code of Virginia.

2. Emergency Storage: (Part I.G.2)
Rationale: 9VAC25-32-550 B and C require certain conditions to be met for temporary storage of biosolids.

3. Temporary Storage: (Part I.G.3)
Rationale: 9VAC25-32-550 B and D require certain conditions be met for temporary storage of biosolids.

PART H. Other Requirements and Special Conditions:

1. **95% Capacity Reopener**
Rationale: Required by VPDES Permit Regulation, 9VAC25-31-200 B 4 for all POTW and PVOTW permits.

2. **Indirect Dischargers**
Rationale: Required by VPDES Permit Regulation, 9VAC25-31-200 B 1 and B 2 for POTWs and PVOTWs that receive waste from someone other than the owner of the treatment works.

3. **CTC, CTO Requirement**
Rationale: Required by the Code of Virginia § 62.1-44.19: Sewage Collection and Treatment Regulations, 9VAC25-790.

4. **Operation and Maintenance Manual Requirement**
Rationale: Required by the Code of Virginia § 62.1-44.19: Sewage Collection and Treatment Regulations, 9VAC25-790; VPDES Permit Regulation, 9VAC25-31-190 E.

5. **Licensed Operator Requirement**
Rationale: The VPDES Permit Regulation, 9VAC25-31-200 C and the Code of Virginia § 54.1-2300 et seq, Rules and Regulations for Waterworks and Wastewater Works Operators (18VAC160-20-10 et seq.), require licensure of operators.

6. **Reliability Class**
Rationale: Required by the Sewage Collection and Treatment Regulations, 9 VAC25-790 for all municipal facilities.

7. **Treatment Works Closure Plan**
Rationale: State Water Control Law § 62.1-44.19. This condition is used to notify the owner of the need for a closure plan where a treatment works is being replaced or is expected to close.

8. **Section 303(d) List (TMDL) Reopener**
Rationale: Section 303(d) of the Clean Water Act requires the total maximum daily loads (TMDLs) be developed for streams listed as impaired. This special condition is to allow the permit to be reopened if necessary to bring it in compliance with any applicable TMDL approved for the receiving stream. The reopener recognizes that, according to Section 402(o)(1)of the Clean Water Act, limits and/or conditions may be either more or less stringent than those contained in the permit. Specifically, they can be relaxed if they are the result of a TMDL, basin plan, or other wasteload allocation prepared under Section 303 of the Act.

PART II, Conditions Applicable to All Permits
Rationale: VPDES Permit Regulation, 9VAC25-31-190 requires all VPDES permits to contain or specifically cite the conditions listed.

21. Changes from the previous permit:

This permit was drafted using guidance provided in the January, 2010 permit manual, which is revised on a continuous basis, resulting in minor changes to permit requirements and conditions.

Based on the performance of the WWTP, current guidance, and best professional judgment, the monitoring frequency for the BOD_5 and total suspended solids is being reduced from 3 days/week to 1 day/week.

PART IB. Special Condition - Bacterial Limitations and Monitoring Requirements - Additional Instructions has been deleted, since the treatment facility is now achieving compliance with the final E.coli permit limitations.

The permit format for sewage biosolids (sludge)/soil limitations and monitoring requirements have been updated. New and updated special conditions for biosolids land application, reporting, and storage are

included.

The land applications sites Scott Wadddle Farm are being added to the VPDES Permit. These sites were previously approved by DEQ on November 8, 1986, as Addendum 1 to the Sludge Management Plan. The Nutrient Management Plan (dated 9/22/2006) for these sites was also approved on this date. An updated Nutrient Management Plan, dated 5/05/2010, has been incorporated into the Sludge Management Plan.

During the previous permit cycle, the permittee completed the water quality criteria monitoring required in PART I F.8. and Attachment A. No water quality violations were detected and this requirement is not being included in the reissued permit.

The new permit also includes the current PART II boilerplate.

22. Regulation of Users: 9 VAC 25-31-280 B 9 - NA

23. Public Notice Information required by 9 VAC 25-31-280 B:

HOW TO COMMENT AND/OR REQUEST A PUBLIC HEARING: DEQ accepts comments and requests for public hearing by e-mail, fax or postal mail. All comments and requests must be in writing and be received by DEQ during the comment period. Submittals must include the names, mailing addresses and telephone numbers of the commenter/requester and of all the persons represented by the commenter/requester. A request for a public hearing must also include; 1) The reason why a public hearing is requested. 2) A brief, informal statement regarding the nature and extent of the requester or of those represented by the requester, including how and to what extent such interest would be directly and adversely affected by the permit. 3) Specific references, where possible, to terms and conditions of the permit and suggested revisions. DEQ may hold a public hearing, including another comment period, if public response is significant and there are substantial, disputed issues relevant to the permit.

CONTACT FOR PUBLIC COMMENTS, DOCUMENT REQUESTS AND ADDITIONAL INFORMATION:
Name: Fred M. Wyatt
Address: DEQ, Southwest Regional Office, P.O. Box 1688, 355 Deadmore Street, Abingdon, Virginia, 24212- 1688 Phone: (276) 676-4810 E-mail: Frederick.Wyatt@deq.virginia.gov Fax: (276) 676-4899

Following the comment period, the Board will make a determination regarding the proposed ***reissuance.*** This determination will become effective, unless the DEQ grants a public hearing. Due notice of any public hearing will be given.

24. Additional Comments:

Application: By letter dated December 23, 2010, the Town of Marion requested application testing waivers, for the FORM 2A NPDES. A copy of this request was sent to EPA on February 3, 2011. If EPA concurs,

the Board intends to grant a waiver for the following application testing requirements:

PART B.6, EFFLUENT TESTING DATA: TKN, nitrate plus nitrite nitrogen, oil and grease, and total phosphorus.

Permit History: VPDES Permit No. VA0086304 for this facility was issued on 7/11/1991, was reissued on 7/11/1996, 7/11/2001, and 7/12/2006 with an expiration date of 7/11/2011.

Threatened or Endangered (T&E) Species: According to the attached printout from the Virginia Fish and Wildlife Information Service, this section of Middle Fork Holston River is classified as both federal and state T&E waters. The following mussel species have been confirmed as present: (FESE)-Rough rabbitsfoot (Quadrula cylindrical strigillata), (FESE)- Tan riffleshell (Epioblasma florintina walkeri), (FCST)-slabside pearlymussel (Lexingtonia dolabelloides), (ST)- Black sandshell(Ligumia recta). These species have also been confirmed as present: (ST)-Longhead darter (Percina macrocephala), (CC)-Eastern hellbender (Cryptobranchus alleganiensis alleganiensis). A T&E Coordination Form has been sent to both the Department of Game & Inland Fisheries (DFIF) and the Department of Conservation & Recreation (DCR).

US Fish & Wildlife Services has previously been notified of the land application sites and no new sites are being added. In accordance with current guidance, T&E coordination is not required, since all the sites have been in continuous agricultural production for more than 5 years.

Federal Storm Water Regulations: The permittee has complied with the Phase 2 requirements by submitting a VIRGINIA DEQ NO EXPOSURE CERTIFICATION FOR EXCLUSION FROM VPDES STORM WATER PERMITTING.

Permit Fee: A permit fee is not required. Only an annual maintenence fee of $7,138 is required, to be paid by October 1 of each year.

Previous Board Action: None

Staff Comments:

Public Comments: None

25. 303(d) listed segments (TMDL): A bacteria TMDL was approved by EPA on 04/12/2010 and by EPA on 12/09/2010. The Town of Marion WWTP is in compliance with the bacterial (E.coli) wasteload allocation in the TMDL.

PLANNING CONCURRENCE FOR MUNICIPAL VPDES PERMIT

PERMIT NO. VA0086304
FACILITY: Town of Marion WWTP
COUNTY: Smyth

[ ] 1. The discharge is in conformance with the existing planning documents for the area.

[ ] 2. The discharge is not addressed in any planning document but will be included, if required, when the plan is updated.

[ ] 3. Other.

_____
Date

Wyatt, Frederick (DEQ)

From: Wyatt, Frederick (DEQ)
Sent: Friday, February 25, 2011 11:18 AM
To: ProjectReview (DGIF)
Subject: Reissuance of VPDES Permit No. VA0086304 for Town of Marion Wastewater Treatment Plant, Smyth Co.
Attachments: TECoordination FormMarion.pdf; abgdnscan@deq.virginia.gov_20110225_121816.pdf

Fred M. Wyatt
Environmental Engineer Senior
(276) 676-4810
email: Frederick.Wyatt@deq.virginia.gov

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY	**VPDES PERMITS** **Threatened and Endangered Species Coordination**
To: X DGIF, Environmental Review Coordinator ☐ DCR ☐ USFWS, T/E Review Coordinator **From: Fred M. Wyatt, Southwest Regional Office,** **fmwyatt@deq.virginia.gov**	**Date Sent: 02/25 /2011** **Permit Number: VA0086304**
Facility Name: Town of Marion WWTP **Contact: John E.B. Clark, Jr.** **Town Manager** **Phone: (276) 783-4113** **Address: P.O. Box 1005** **Marion, VA 24354**	**Location: 1580 Daisy Lane, Marion, VA** **Smyth Co.** **USGS Quadrangle: Marion, VA** **Latitude/Longitude: 36⁰49'21"/ 81⁰33'08"** **Receiving Stream: Middle Fork Holston River** **Receiving Stream Flow Statistics used for Permit:** **7Q10 : 11.9 MGD** **High Flow 7Q10: 14.5 MGD** **1Q10 : 9.3 MGD** **High Flow 1Q10: 12.5 MGD** **30Q10: 17.7 MGD** **High Flow 30Q10: 36.4 MGD** **See attached location map.**
Effluent Characteristics and Max Daily Flow: **Design Flow : 3.4 MGD** **See attached sheets**	**Species Search Results:** **Mussels: (FESE)-Rough rabbitsfoot (Quadrula cylindrical strigillata), (FESE)- Tan riffleshell (Epioblasma florintina walkeri), (FCST)-slabside pearlymussel (Lexingtonia dolabelloides), (ST)-Black sandshell (Ligumia recta). Other: (ST)-Longhead darter (Percina macrocephala), (CC)-Eastern hellbender (Cryptobranchus alleganiensis alleganiensis).**

Attach draft permit effluent limits page if available.

DGIF email: projectreview@dgif.virginia.gov
USF&W fax: (804)693-9032

Virginia Department of Game and Inland Fisheries

2/2/2011 7:46:51 AM

Fish and Wildlife Information Service

VaFWIS Initial Project Assessment Report

Help

Compiled on 2/2/2011, 7:46:51 AM 324000.0

Known or likely to occur within a **2 mile radius of 36,49,21.0 -81,33,07.8** in **173 Smyth County, VA**

468 Known or Likely Species ordered by Status Concern for Conservation (displaying first 37) (37 species with Status* or Tier I**)

BOVA Code	Status*	Tier**	Common Name	Scientific Name	Confirmed	Database(s)
060094	FESE	I	Pearlymussel, littlewing	Pegias fabula		BOVA
060052	FESE	I	Pigtoe, shiny	Fusconaia cor		BOVA
060122	FESE	I	Rabbitsfoot, rough	Quadrula cylindrica strigillata	Yes	TEWaters
060036	FESE	I	Riffleshell, tan	Epioblasma florentina walkeri	Yes	TEWaters,BOVA,HU6
050021	FESE	II	Bat, gray	Myotis grisescens	Yes	Collections,HU6
010330	FTST	I	Chub, spotfin	Erimonax monachus		BOVA,HU6
010430	SE	I	Dace, Tennessee	Chrosomus tennesseensis		BOVA,HU6
010344	SE	I	Darter, sharphead	Etheostoma acuticeps		HU6
040267	SE	I	Wren, Bewick's	Thryomanes bewickii		BOVA
050068	SE	I	Squirrel, Virginia northern flying	Glaucomys sabrinus fuscus		BOVA
060080	SE	II	Heelsplitter, Tennessee	Lasmigona holstonia		BOVA,HU6

060139	FSSE	II	Lilliput, purple	Toxolasma lividus		BOVA
060007	SE	II	Mussel, slippershell	Alasmidonta viridis		BOVA
070118	FSSE	II	Crayfish, Big Sandy	Cambarus veteranus		BOVA
040096	ST	I	Falcon, peregrine	Falco peregrinus		BOVA
040293	ST	I	Shrike, loggerhead	Lanius ludovicianus		BOVA,HU6
040385	ST	I	Sparrow, Bachman's	Aimophila aestivalis		BOVA
010352	ST	II	Darter, greenfin	Etheostoma chlorobranchium		BOVA
010342	ST	II	Darter, longhead	Percina macrocephala	Yes	TEWaters,BOVA,HU6
040093	FSST	II	Eagle, bald	Haliaeetus leucocephalus		BOVA,HU6
060083	FCST	II	Pearlymussel, slabside	Lexingtonia dolabelloides	Yes	TEWaters,BOVA,HU6
060069	FSST	III	Riversnail, spiny	Io fluvialis		BOVA
060086	ST	III	Sandshell, black	Ligumia recta	Yes	TEWaters,HU6
040292	ST		Shrike, migrant loggerhead	Lanius ludovicianus migrans		BOVA
060146	FS	II	Bean, rayed	Villosa fabalis		BOVA
060121	FC	II	Kidneyshell, fluted	Ptychobranchus subtentum		BOVA,HU6
100248	FS	I	Fritillary, regal	Speyeria idalia idalia		BOVA,HU6
010341	FS	II	Logperch, blotchside	Percina burtoni		BOVA
060050	FS	II	Pigtoe, Tennessee	Fusconaia barnesiana		BOVA,HU6
070010	FS	III	Amphipod, James Cave	Stygobromus abditus		BOVA
100001	FS	IV	fritillary, Diana	Speyeria diana		BOVA

020020	CC	II	Hellbender, eastern	Cryptobranchus alleganiensis alleganiensis	Yes	Collections,BOVA,HU6
030012	CC	IV	Rattlesnake, timber	Crotalus horridus		BOVA,HU6
040372		I	Crossbill, red	Loxia curvirostra		BOVA
040225		I	Sapsucker, yellow-bellied	Sphyrapicus varius		BOVA,HU6
040319		I	Warbler, black-throated green	Dendroica virens		BOVA
040306		I	Warbler, golden-winged	Vermivora chrysoptera		BOVA,HU6

To view **All 468 species** View 468

* FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FP=Federal Proposed; FC=Federal Candidate; FS=Federal Species of Concern; SC=State Candidate; CC=Collection Concern; SS=State Special Concern (obsolete January 1, 2011)

** I=VA Wildlife Action Plan - Tier I - Critical Conservation Need; II=VA Wildlife Action Plan - Tier II - Very High Conservation Need; III=VA Wildlife Action Plan - Tier III - High Conservation Need; IV=VA Wildlife Action Plan - Tier IV - Moderate Conservation Need

Anadromous Fish Use Streams

N/A

Colonial Water Bird Survey

N/A

Threatened and Endangered Waters (2 Reach es)

View Map of All Threatened and Endangered Waters

Stream Name	T&E Waters Species

	Highest TE*	BOVA Code, Status*, Tier**, Common & Scientific Name					View Map
Middle Fork Holston River (06010102)	FESE	010342	ST	II	Darter, longhead	Percina macrocephala	Yes
		060036	FESE	I	Riffleshell, tan	Epioblasma florentina walkeri	
		060083	FCST	II	Pearlymussel, slabside	Lexingtonia dolabelloides	
		060086	ST	III	Sandshell, black	Ligumia recta	
		060122	FESE	I	Rabbitsfoot, rough	Quadrula cylindrica strigillata	
Middle Fork Holston River (06010102)	FESE	060086	ST	III	Sandshell, black	Ligumia recta	Yes
		060122	FESE	I	Rabbitsfoot, rough	Quadrula cylindrica strigillata	

Managed Trout Streams (2 records) (Click on Stream Name to view complete reach history) **View Map of All Trout Stream Surveys**

Reach ID	Stream Name	Class	Brook Trout	Brown Trout	Rainbow Trout	View Map
03LRL-01	Laurel Spring Creek	Stockable				Yes
03MFH-01	Middle Fork Holston River	Stockable			Y	Yes

Bald Eagle Concentration Areas and Roosts

N/A

Public Holdings: (1 names)

Name	Agency	Level
Jefferson National Forest	U.S. Forest Service	Federal

audit no. 324000 2/2/2011 7:46:51 AM Virginia Fish and Wildlife Information Service

TE Waters Group Middle Fork Holston River (06010102)

36,49,20.9 -81,33,06.9
is **the Search Point**

Display **Item Location** is not in center at map center

Show Position Rings
○ Yes ◉ No
1 mile and 1/4 mile at the **Search Point**

Show Search Area
◉ Yes ○ No
2 Search distance miles radius

Search Point is at map center

Base Map Choices
Topography

Map Overlay Choices
Current List: Search, Observation

Map Overlay Legend

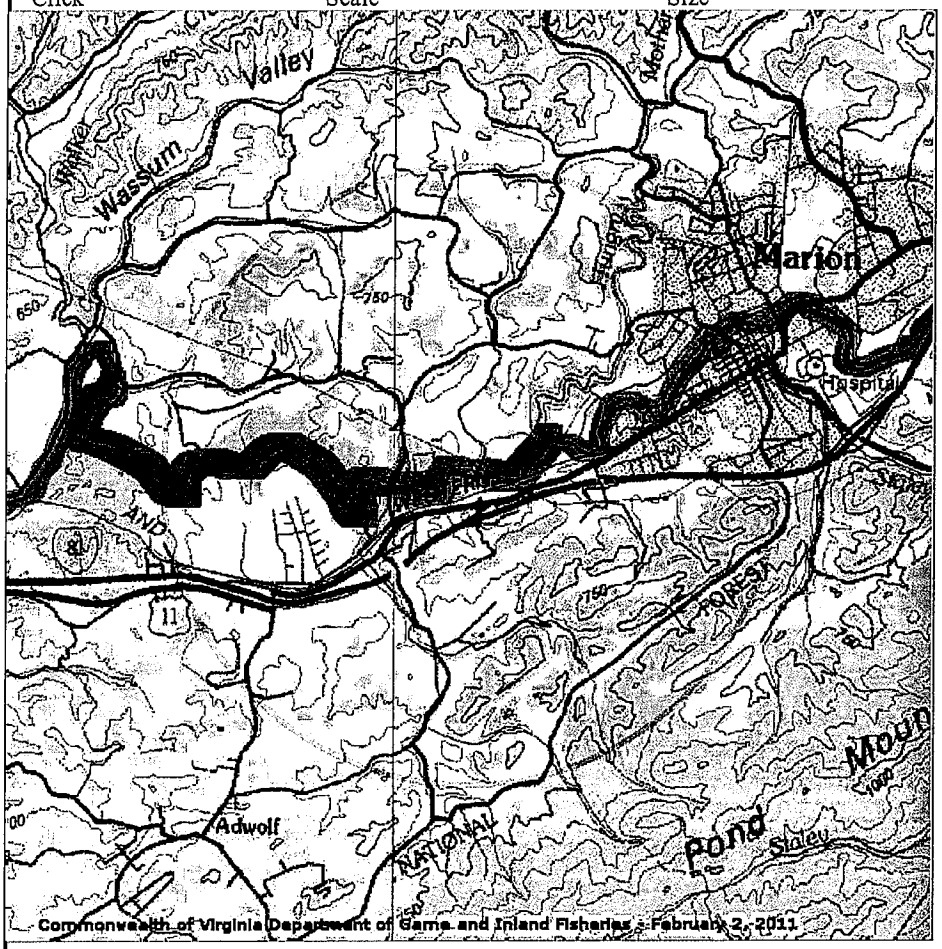
T & E Waters
Federal
Selected Federal
State
Selected State

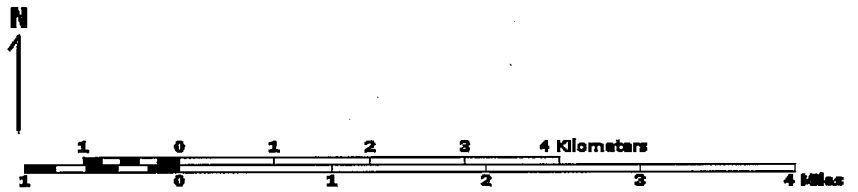
2 mile radius Search Area

Data Collection Site

Refresh Browser Page

Map Click | Map Scale In Zoom Out | Screen Size Small Size Big | Help





Point of Search 36,49,20.9 -81,33,06.9
Map Location 36,49,20.9 -81,33,06.9

Select **Coordinate System:**
◉ Degrees,Minutes,Seconds Latitude - Longitude
○ Decimal Degrees Latitude - Longitude
○ Meters UTM NAD83 East North Zone
○ Meters UTM NAD27 East North Zone

Base Map source: USGS 1:100,000 topographic maps (see Microsoft terraserver-usa.com for details)

Map projection is UTM Zone 17 NAD 1983 with left 445994 and top 4080140. Pixel size is 16 meters . Coordinates displayed are Degrees, Minutes, Seconds North and West.Map

is currently displayed as 600 columns by 600 rows for a total of 360000 pixles. The map display represents 9600 meters east to west by 9600 meters north to south for a total of 92.1 square kilometers. The map display represents 31501 feet east to west by 31501 feet north to south for a total of 35.5 square miles.

Topographic maps and Black and white aerial photography for year 1990+-
are from the United States Department of the Interior, United States Geological Survey.
Color aerial photography aquired 2002 is from Virginia Base Mapping Program, Virginia Geographic Information Network.
Shaded topographic maps are from TOPO! ©2006 National Geographic
http://www.national.geographic.com/topo
All other map products are from the Commonwealth of Virginia Department of Game and Inland Fisheries.

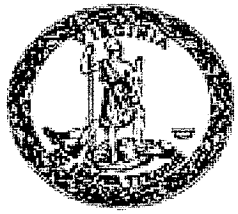
map assembled 2011-02-02 07:45:04 (qa/qc July 20, 2010 10:15 - tn=324000.0 dist=3218 I)

Wyatt, Frederick (DEQ)

From: gis@timmons.com
Sent: Thursday, February 03, 2011 1:27 PM
To: nhwebreview (DCR); Wyatt, Frederick (DEQ)
Subject: Town of Marion Wastewater Treatment Plant - frederick.wyatt@deq.virginia.gov
Attachments: DCR_NH_REPORT.pdf

Thank you for submitting your project to DCR Natural Heritage. Attached is an overview of the results and potential conflicts.

Douglas W. Domenech
Secretary of Natural Resources



David A. Johnson
Director

COMMONWEALTH of VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION

The project mapped as part of this report has been searched against the Department of Conservation and Recreation's Biotics Data System for occurrences of natural heritage resources from the area indicated for this project. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

According to the information currently in Biotics files, NATURAL HERITAGE RESOURCES HAVE BEEN DOCUMENTED within two miles of the indicated project boundaries.

You have submitted this project to DCR for a more detailed review for potential impacts to natural heritage resources. DCR will review the submitted project to identify the specific natural heritage resources in the vicinity of the proposed project. Using the expertise of our biologists, DCR will evaluate whether your specific project is likely to impact these resources, and if so how. DCR's response will indicate whether any negative impacts are likely and, if so, make recommendations to avoid, minimize and/or mitigate these impacts. If the potential negative impacts are to species that are state- or federally-listed as threatened or endangered, DCR will also recommend coordination with the appropriate regulatory agencies: the Virginia Department of Game and Inland Fisheries for state-listed animals, the Virginia Department of Agriculture and Consumer Services for state-listed plants and insects, and the United States Fish and Wildlife Service for federally listed plants and animals. If your project is expected to have positive impacts we will report those to you with recommendations for enhancing these benefits.

Please allow up to 30 days for a response.

We will review the project based on the information you included in the Project Info submittal form, which is included in the report that follows. Often additional information can help us make a more accurate and detailed assessment of a project's potential impacts to natural heritage resources. If you have additional information that you believe will help us better assess your project's potential impacts, you may send that information to us. Please refer to the project Title (from the first page of this report) and include this pdf file with any additional information you send us.

Thank you for submitting your project for review to the Virginia Natural Heritage Program through the NH Data Explorer. Should you have any questions or concerns about DCR, the Data Explorer, or this report, please contact the Natural Heritage Project Review Unit at 804-371-2708.
its.

DCR
Department of Conservation & Recreation
CONSERVING VIRGINIA'S NATURAL & RECREATIONAL RESOURCES

WebID: W634323364198437500

Client Project Number: VA0086304

PROJECT INFORMATION

TITLE: Town of Marion Wastewater Treatment Plant

DESCRIPTION: Reissuance of 3.4 MGD VPDES Permit for existing dishcarge

EXISTING SITE CONDITIONS: Existing 3.4 MGD discharge into the Middle Fork Holston River

QUADRANGLES: MARION

COUNTIES: Smyth

Latitude/Longitude (DMS): 364921/813307

Acreage: 1

Comments: Complete mix of existing 3.4 MGD discharge into the Middle Fork Holston calculated to be at 450 ft. at a 7Q10 of 11.9 MGD. No proposed permit modifications or plant expansion at this reissuance.

REQUESTOR INFORMATION

Priority: No **Tier Level:** 2 **Tax ID:**

Contact Name: Frederick M Wyatt

Company Name: DEQ-Southwest Regional Office

Address: PO Box 1688

City: Abingdon **State:** VA **Zip:** 24212

Phone: 276-676-4810 **Fax:** 276-676-4899 **Email:** frederick.wyatt@deq.virginia.gov

Conservation Site Name	Site Type	Brank	Acreage	Listed Species Presence
	GLNHR			NL
	GLNHR			NL
	GLNHR			NL
	GLNHR			NL
MIDDLE FORK HOLSTON RIVER - SULPHUR SPRING CREEK SCU	SCU	B3	85	FL
McMULLIN	Conservation Site	B4	431	NL
CRAB 81	Conservation Site	B3	474	NL

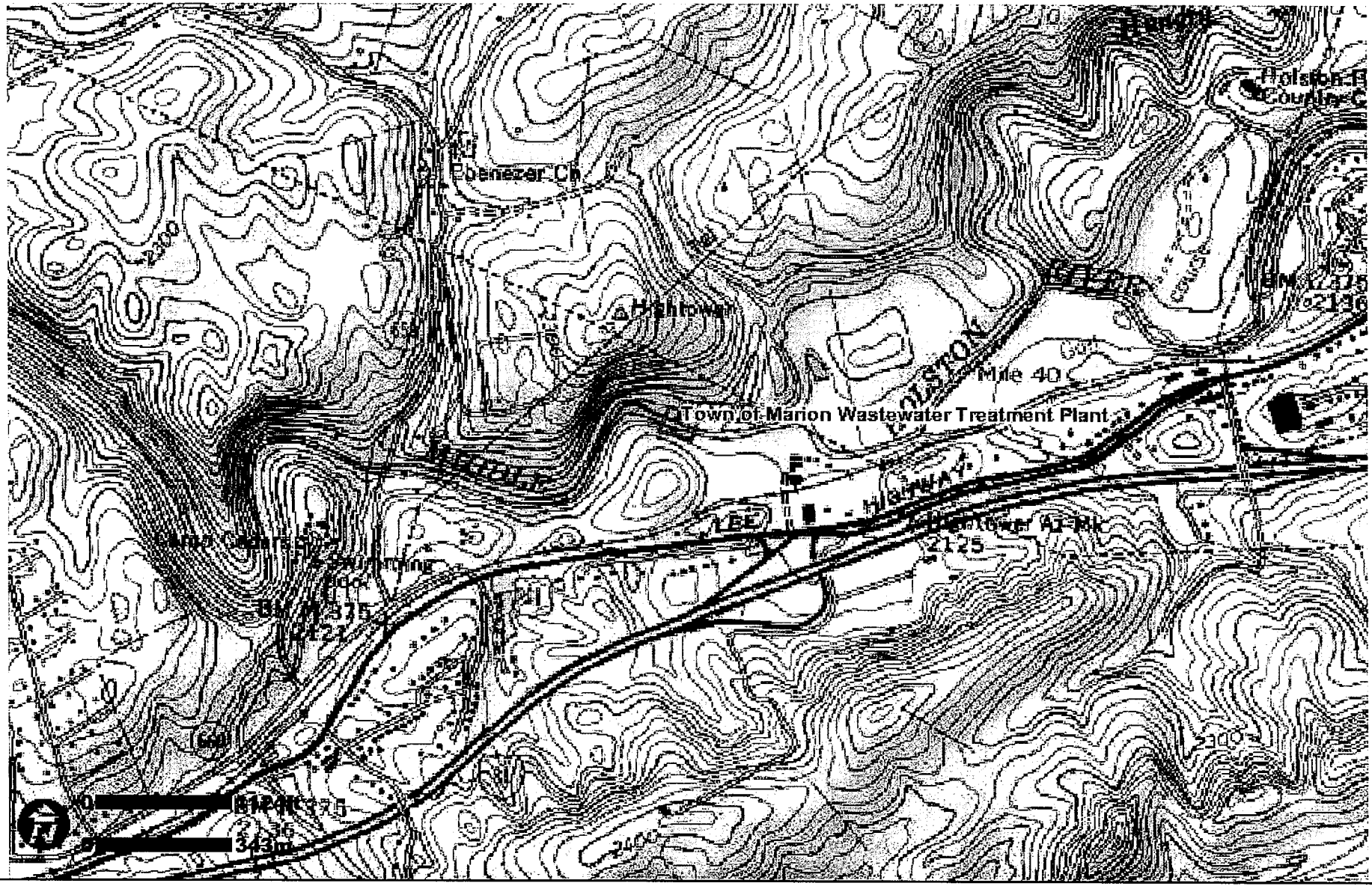
Natural Heritage Conservation Sites within Search Radius

Site-Name	Group-Name	common-name	scientific-name	GRANK	SRANK	Fed Status	st status	EO Rank	last obs date	precision
	Invertebrate Animal	Tennessee Pigtoe	Fusconaia barnesiana	G2G3	S2	SOC	SC	H?	1988-09-01	S
	Vascular Plant	Appalachian Bugbane	Cimicifuga rubifolia	G3	S2			H	1875-	M
	Vascular Plant	Heart-leaved Plantain	Plantago cordata	G4	SH			H	1893-	M
	Vertebrate Animal	Black Sculpin	Cottus baileyi	G4Q	S2			H?	1985-12-17	S
MIDDLE FORK HOLSTON RIVER - CRAIG BRIDGE SCU	Invertebrate Animal	Tennessee Clubshell	Pleurobema oviforme	G2G3	S2S3	SOC		C	1998-09-16	S

Natural Heritage Resources within Search Radius

DIABASE	INFO	SERIES	PRIORITY
NO	Beekmantown Group	Cambrian and Lower Ordovician Carbonates	
NO	Mocassin Formation, Bays Formation, Unit C, Unit B, Unit A	Middle Ordovician Limestones	

Affected Diabase Elements



Quads: MARION

Counties: Smyth

Town of Marion Wastewater Treatment Plant

Company: DEQ-Southwest Regional Office

Lat/Long: 364921/813307

Douglas W. Domenech
Secretary of Natural Resources

David A. Johnson
Director

COMMONWEALTH of VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION

Division of Natural Heritage
217 Governor Street
Richmond, Virginia 23219-2010
(804) 786-7951

February 28, 2011

Fred Wyatt
DEQ-SRO
P.O. Box 1688
Abingdon, VA 24212

Re: VA0086304, Town of Marion Wastewater Treatment Plant

Dear Mr. Wyatt:

The Department of Conservation and Recreation's Division of Natural Heritage (DCR) has searched its Biotics Data System for occurrences of natural heritage resources from the area outlined on the submitted map. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

According to the information currently in our files, the Middle Fork Holston River – Sulphur Spring Creek Stream Conservation Unit is located upstream from the project site. Stream Conservation Units (SCUs) identify stream reaches that contain aquatic natural heritage resources, including 2 miles upstream and 1 mile downstream of documented occurrences, and all tributaries within this reach. SCUs are also given a biodiversity significance ranking based on the rarity, quality, and number of element occurrences they contain. The Middle Fork Holston River – Sulphur Spring Creek SCU has been given a biodiversity ranking of B2, which represents a site of very high significance. Natural heritage resources associated with this site are:

Cottus baileyi	Black sculpin	G4Q/S2/NL/NL
Epioblasma florentina walkeri	Tan riffleshell	G1T1/S1/LE/LE
Fusconaia barnesiana	Tennessee pigtoe	G2G3/S2/SOC/NL
Lasmigona holstonia	Tennessee heelsplitter	G3/S1/NL/LE
Lexingtonia dolabelloides	Slabside pearlymussel	G2/S2/SOC/LT
Pleurobema oviforme	Tennessee clubshell	G2G3/S2S3/SOC/NL
Ptychobranchus subtentum	Fluted kidneyshell	G2/S2/SOC/NL

In addition, Middle Fork Holston River 1, which has been designated by the Virginia Department of Game and Inland Fisheries (VDGIF) as a "Threatened and Endangered Species Water", is within the project site. The species associated with this T & E Water are Tan riffleshell, Slabside pearlymussel, Purple bean (*Villosa perpurpurea*, G1/S1/LE/LE), Rough rabbits foot (*Quadrula cylindrical strigillata*, G3T2/S2/LE/LE), Little-winged pearlymussel (*Pegias fabula*, G1/S1/LE/LE), Turquoise shiner (*Erimonax monachus*, G2/S1/LT/LT) and Black sandshell (*Ligumia recta*, G5/S2/NL/LT).

Due to the legal status of many of the natural heritage resources associated with this site, DCR recommends coordination with the U.S. Fish and Wildlife Service (USFWS) and the VDGIF to ensure compliance with protected species legislation. DCR supports the use of uv/ozone for disinfection and utilization of new technologies as they become available to improve water quality.

Our files do not indicate the presence of any State Natural Area Preserves under DCR's jurisdiction in the project vicinity.

Under a Memorandum of Agreement established between the Virginia Department of Agriculture and Consumer Services (VDACS) and the Virginia Department of Conservation and Recreation (DCR), DCR represents VDACS in comments regarding potential impacts on state-listed threatened and endangered plant and insect species. The current activity will not affect any documented state-listed plants or insects.

New and updated information is continually added to Biotics. Please contact DCR for an update on this natural heritage information if a significant amount of time passes before it is utilized.

The Virginia Department of Game and Inland Fisheries maintains a database of wildlife locations, including threatened and endangered species, trout streams, and anadromous fish waters that may contain information not documented in this letter. Their database may be accessed from http://vafwis.org/fwis/ or contact Shirl Dressler at (804) 367-6913.

Should you have any questions or concerns, feel free to contact me at 804-371-2708. Thank you for the opportunity to comment on this project.

Sincerely,

S. Rene' Hypes
Project Review Coordinator

CC: Tylan Dean, USFWS
Ernie Aschenbach, VDGIF

Wyatt, Frederick (DEQ)

From: Frazier, Teresa (DEQ)
Sent: Wednesday, February 02, 2011 10:14 AM
To: Wyatt, Frederick (DEQ)
Subject: Marion WWTP TMDL fact sheets
Attachments: 2010_FS_MFHMarion.pdf

Attached is the fact sheet for Middle Fork Holston at Marion the segment that the WWTP is on is VAS-O04R_MFH01A00.

Aquatic Life Use in the segment has observed effects for DDT and Total Phosphorus.

Fish Consumption Use in the segment has observed effects for Mercury.

Teresa Frazier

DEQ Southwest Regional Office | 276.676.4805 | Teresa.Frazier@deq.virginia.gov

2010 Impaired Waters

Categories 4 and 5

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

Tennessee and Big Sandy River Basins

Cause Group Code: **O03R-01-BAC** **Middle Fork Holston River**

Location: This segment extends from the headwaters downstream to the Neff community, Bear Creek from the confluence with the Middle Fork Holston River upstream 2.4 miles, and Staley Creek from the Middle Fork Holston River confluence upstream to the National Forest.

City / County: Smyth Co. Washington Co. Wythe Co.

Use(s): Recreation

Cause(s) / VA Category: Escherichia coli / 5A Fecal Coliform / 5A

The AWQM station, 6CMFH 53.36 had a 31% exceedence of the bacteria water quality standard, 6CMFH045.72, had a 22% exceedence and an additional station at 6CMFH040.67 had a 58% exceedence of the bacteria standard. Station 6CMFH033.40 had a 48% exceedence of the E.coli water quality standard and 6CMFH013.21 had a 25% exceedence of the E.coli water quality standard. 6CBER000.17 had a 33% exceedence of the E. coli water quality standard.

Assessment Unit / Water Name / Description	Cause Category	/ Name	Cycle First Listed	TMDL Schedule	Size
VAS-O03R_BER01A02 / Bear Creek / Middle Fork Holston River tributary flows south, west of Atkins, WQS Section 5c.	5A	Escherichia coli	2010	2022	5.57
VAS-O03R_MFH01A00 / Middle Fork Holston River / From Marion raw water intake, near Mt Carmel, downstream to Hungry Mother Creek confluence, including Town of Marion, section 5.	5A	Escherichia coli	2010	2014	5.44
VAS-O03R_MFH02A00 / Middle Fork Holston River / From Marion raw water intake, 45.83, through Atkins to the Snavely Creek confluence, WQS Section 5c, DGIF vi.	5A	Escherichia coli	2010	2014	5.17
VAS-O03R_MFH05A04 / Middle Fork Holston River / Mainstem headwaters upstream of Dutton Branch confluence at Groseclose, WQS Section 5, DGIF vi; originates in Kinser Valley in Wythe County.	5A	Escherichia coli	2010	2022	3.26
VAS-O03R_STA01A02 / Staley Creek / Middle Fork Holston River tributary from I 81 upstream to National Forest, including Currin Valley, WQS Section 5, DGIF vi.	5A	Escherichia coli	2010	2022	5.85
VAS-O03R_STA01B10 / Staley Creek / Middle Fork Holston River tributary on the west side of Marion, upstream to I 81, WQS Section 5, DGIF vi.	5A	Escherichia coli	2010	2022	1.00
VAS-O04R_MFH01A00 / Middle Fork Holston River / Mainstem Middle Fork Holston River from Hungry Mother Creek confluence downstream to Sulfur Spring Creek confluence, section 5.	5A	Escherichia coli	2002	2014	12.59
VAS-O05R_MFH03A00 / Middle Fork Holston River / Mainstem Middle Fork Holston River from just downstream of Neff to Edmondson Dam, WQS Section 5.	5A	Escherichia coli	2002	2014	4.18
VAS-O05R_XDY01A08 / Middle Fork Holston tributary / Enters at SR 803 crossing near the USGS gaging station, WQS Section 5.	5A	Escherichia coli	2008	2020	0.79

Middle Fork Holston River	Reservoir (Acres)	River (Miles)
Escherichia coli - Total Impaired Size by Water Type:		43.85

2010 Impaired Waters

Categories 4 and 5

Tennessee and Big Sandy River Basins

Assessment Unit / Water Name / Description	Cause Category	/ Name	Cycle First Listed	TMDL Schedule	Size
VAS-O03R_MFH01A00 / Middle Fork Holston River / From Marion raw water intake, near Mt Carmel, downstream to Hungry Mother Creek confluence, including Town of Marion, section 5.	5A	Fecal Coliform	2002	2014	5.44
VAS-O03R_MFH02A00 / Middle Fork Holston River / From Marion raw water intake, 45.83, through Atkins to the Snavely Creek confluence, WQS Section 5c, DGIF vi.	5A	Fecal Coliform	2002	2014	5.17
VAS-O03R_MFH04A98 / Middle Fork Holston River / From Dutton Branch confluence at Groseclose downstream to the at the Snavely Branch confluence, WQS Section 5, DGIF vi.	5A	Fecal Coliform	2002	2014	4.21
VAS-O05R_MFH04A00 / Middle Fork Holston River / Mainstem Middle Fork Holston River from Sulphur Springs Creek downstream to Rt 91 bridge confluence, WQS Section 5.	5A	Fecal Coliform	2002	2014	9.17
VAS-O05R_MFH05A04 / Middle Fork Holston River / Mainstem Middle Fork Holston River from Edmondson Dam upstream to Rt 91 bridge, downstream to Rt 91 bridge confluence, WQS Section 5a.	5A	Fecal Coliform	2002	2014	3.65

Middle Fork Holston River	Reservoir (Acres)	River (Miles)
Fecal Coliform - Total Impaired Size by Water Type:		27.64

Sources:

Rural (Residential Areas) Source Unknown Unrestricted Cattle Access

DEQ Virginia Department of Environmental Quality

Search for Approved TMDL Reports

To return all records, simply click the Search button without entering any criteria.

Watershed ID		*example searches: B17R, b, 17, r*
Waterbody Name	Middle Fork Holston	*example searches: Opequon Creek, OPEQUON, op*
City/County	Smyth	*example searches: Albemarle, ALB, albem*
Major River Basin	Holston River Basin	
Pollutant		
EPA Approval Date (Year)		
SWCB Approval Date (Year)		

Search Clear form

Approved TMDL reports

Displaying 1 result.

TMDL Project	Basin	City/County	Watershed ID	Pollutant (s)	Comment document	Final report	EPA approval date	SWCB approval date	Comments
Middle Fork Holston River Watershed	Holston River	Washington, Smyth	O03R, O04R, O05R	Bacteria Sediment	-	Final report	04/12/2010 EPA rationale	12/09/2010	

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Table 7.11. Expansion matrix for bacteria WLA in the Middle Fork Holston River (VAS-O04R-01) watershed.

Permit No	Facility Name	Design Flow (MGD)	Effluent Limit (cfu/100ml)	Wasteload Allocation (cfu/yr)
VA0086304	Marion WWTP	3.400	126	5.92E+12
8 Domestic Sewage General Permits		0.008	126	1.39E+10
Point Source Future Growth Allocation (5x)		17.040	126	2.97E+13
			Total	3.56E+13

Table 7.12. Annual nonpoint source fecal coliform and *E. coli* loads for existing conditions and final allocation along with corresponding reductions in Middle Fork Holston River (VAS-O04R-01) impairment.

Source	Fecal Coliform		*E. coli*[1]		Scenario Reduction
	Existing Condition Load (cfu/yr)	TMDL Allocation Load (cfu/yr)	Existing Condition Load (cfu/yr)	TMDL Allocation Load (cfu/yr)	(%)
Direct					
Straight Pipes	3.84E+13	0.00E+00	3.02E+12	0.00E+00	100
Livestock	8.85E+13	1.77E+12	6.50E+12	1.78E+11	98
Wildlife	5.33E+13	5.33E+13	4.08E+12	4.08E+12	0
Total	*1.80E+14*	*5.51E+13*	*1.36E+13*	*4.26E+12*	69
Land-based					
Residential	2.21E+15	4.42E+13	1.25E+14	3.43E+12	98
Cropland	1.27E+14	2.54E+12	9.06E+12	2.49E+11	98
Pasture	8.49E+16	1.70E+15	3.58E+15	9.83E+13	98
Forest	2.36E+14	2.36E+14	1.60E+13	1.60E+13	0
Total	*8.75E+16*	*1.98E+15*	*3.73E+15*	*1.18E+14*	98

[1] Loads derived from fecal coliform loads using equation 7.2

expression of sediment loadings in the Middle Fork Holston River TMDL is the annual average loading. Table 7.27 shows the total load, wasteload allocations, and margin of safety for Lower Middle Fork Holston River expressed as an average annual load. No sediment reductions to the point sources in Lower Middle Fork Holston River are required. The recommended allocations for each nonpoint source are provided in Table 7.26. Overall, the sediment load in the Lower Middle Fork Holston River watershed must be reduced by 60% in order to meet the established TMDL endpoint.

Table 7.27. Yearly sediment loads (T/yr) modeled after TMDL allocation in Lower Middle Fork Holston River impairment.

WLA (T/yr)	LA (T/yr)	MOS (T/yr)	TMDL (T/yr)
100.4	1,448.8	198.0	1,747.2

In order to comply with current USEPA guidance (USEPA, 2007), the Middle Fork Holston River sediment TMDL was also expressed as a daily load by evaluating the variability and distribution of simulated loads (Table 7.28). The following formula from USEPA's *Technical Support Document for Water Quality-Based Toxics Control* (USEPA, 1991) and USEPA's draft *Options for Expressing Daily Loads in TMDLs* (USEPA, 2007) was used to calculate the daily expression of the TMDL:

$$MDL = LTA * \exp(Z_p \sigma_y - 0.5\sigma_y^2) \qquad [7.2]$$

where,

MDL = maximum daily load,

LTA = long term average, which in this case is the average daily load calculated as the average annual load divided by 365,

Z_p = p^{th} percentage point of the standard normal distribution (95^{th} percentile was used),

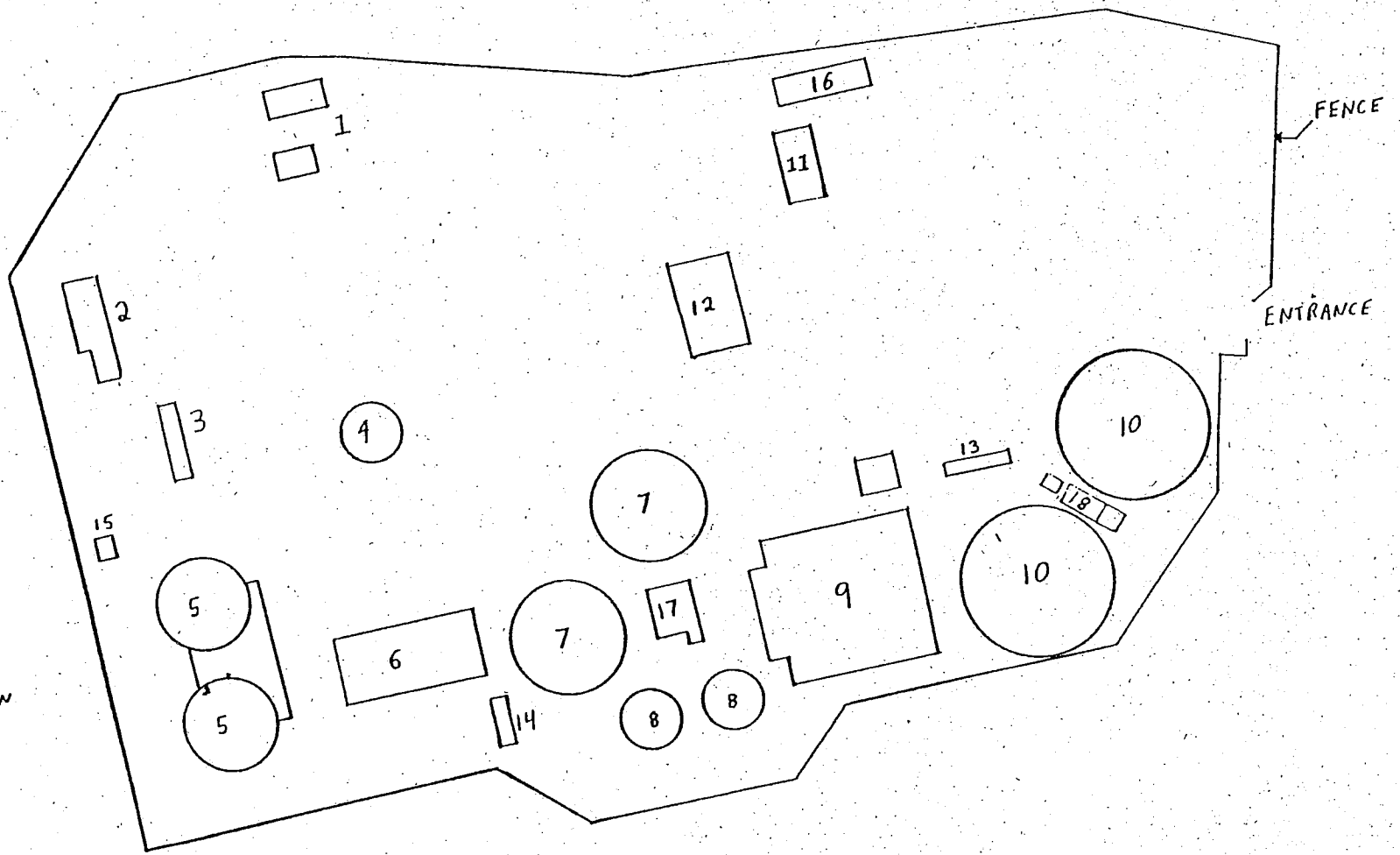
$\sigma_y = \sqrt{\ln(CV^2 + 1)}$, and

CV = coefficient of variation (estimated at 0.6).

The total maximum daily load was determined from Equation 7.2 using a 95^{th} percentile, a CV of 0.6, and a long term average of 4.79 T/d. It should be noted that the maximum daily load expression represents extreme conditions (with a 5% frequency of occurrence), and routine loadings of this level would not meet average annual loadings that are necessary to restore aquatic life health.

LEGEND

1 INFLUENT PUMP STATION
2 HEADWORKS
3 SPLITTER
4 GRAVITY THICKENER
5 ANAEROBIC DIGESTER
6 DEWATERING BUILDING
7 PRIMARY CLARIFIER
8 BIO-FILTER
9 AERATION BASIN
10 SECONDARY CLARIFIER
11 UV BUILDING
12 LABORATORY
13 SECONDARY FLOW SPLITTER
14 CAUSTIC SODA TANK
15 DIGESTER GAS BURNER
16 POST AIR/EFFLUENT FLUME
17 BIO-FILTER PUMP STATION
18 RETURN SLUDGE PUMP STATION



PLANT SITE PLAN

FIG IV-1

ATTACHMENT A

Marion Regional Sewage Treatment Works
Unit Operations Design Parameters

Hydraulic Loading

Average flow = 3.4 MGD
Peak flow = 10 MGD

Organic Loading

BOD_5 248 mg/l

Influent Pump Station

Three (3) variable flow, constant speed pumps provided

	Min.	Max.	
GPM	1375	3800	(each pump)
TDH	46	53.5	
RPM	1800	1800	
BHP	44.4	64.2	
EFF.	36	80	

Screening Devices

Manually cleaned bar screen No. 1

location	ahead of influent pumps
channel width	3.5 ft.
bar spacing	2.5 in.
bar size	3/8 in. thick x 2½ in. wide

Manually cleaned bar screen No. 2

location	headworks
channel width	2.5 ft.
bar spacing	0.5 in.
bar size	3/8 in. thick x 2½ in. wide

Mechanical screen

self-cleaning filter screen	
channel width	2.0 ft.
angle-of-inclination	75° from horizontal
screen spacing	0.5 in.
max. hydraulic capacity	11.0 MGD
conveyor capacity	2.5 cu.yd./hr.

Grit Removal Facilities

Mechanically cleaned unit	
aerated chamber	2-3 SCFM/ft. length at 4.9 psig
aeration capacity	3.9 minutes
HRT @ Q avg.	6 ft. x 35 ft. x 8.5 ft. SWD
channel dimensions	chain and bucket
grit collection type	
Manually cleaned unit	
aerated chamber	same
aeration capacity	same
channel dimensions	

Primary Clarifiers

number of units	2
diameter	55 ft.
depth	10 ft.
WOR @ Q avg.	9,839 gpd/ft.^{2}
SOR @ Q avg.	716 gpd/ft.^{2}
SOR @ Q peak	2,105 gpd/ft.^{2}

Roughing Filters

Activated Biofilters (ABF) (bid option A)	
number of units	2
hydraulic loading @ Q avg. and 100% RAS recycle	171 MG/acre/day (2.73 gpm/ft.^{2})
organic loading @ Q avg. and 100% RAS recycle	8,884 lb. BOD_5/acre/day (204 lb/1000 cu.ft.)
dosing	four (4) variable speed, V-belt drive, suction lift sewage pumps (3,333 gpm @ 46.5 ft. TDH, 925 rpm, 50 hp motor)
distribution equipment	header/lateral w/non-plugging, curved plate type distributors
media	horizontal racks of redwood
media dimensions	24 ft. x 36 ft. x 14 ft. deep

Aeration Basins

number of units	4
basin dimensions	20 ft. x 80 ft. x 18 ft. SWD
total volume	861,696 gallons
HRT @ Q avg.	6.1 hrs.
aeration equipment	three (3) centrifugal blowers, 1,785 SCFM, 100 hp
	max. SOTR = 19,465 lb/day
	fixed fine bubble diffusers
chemical feed	two (2) liquid caustic soda feeders
	20 gal/hr. capacity per feeder
	4,000 gallon caustic day tank

Secondary Clarifiers

number of units	2
diameter	80 ft.
depth	12 ft.
WOR @ Q avg.	7,842 gpd/ft.
SOR @ Q avg.	338 gpd/ft.^{2}
SOR @ Q peak	995 gpd/ft.^{2}
solids loading @ Q avg.	0.7 gpd/ft.^{2}/hr.
solids loading @ Q peak	1.4 lb/ft.^{2}/hr.

Disinfection

min. design dosage	50,000 microwatts-sec/cm^2
type of assemblies	open channel, submerged, vertical
lamp arrangement	2 parallel channels
	4 banks/channel
	2 modules/bank
	28 lamps/module
	224 lamps/channel
	3.0 in. lamp spacing
lamp specifications	90% min. light emittance at 253.7 nm
	58 in. min. arc length
	190 microwatts/cm^2 output at 1.0 m
	7500 hrs. min. rated life
measurement equipment	one (1) uv intensity meter per channel
	one (1) elapsed time meter per bank
control equipment	automatic control using flow pacing by effluent flow meter and manual control.
spare parts	10% of total bulbs per assembly
	10% of total quartz tubes per assembly
	5% of total ballasts per assembly
	one (1) uv intensity sensor
maintenance equipment	one (1) portable cleaning system
contact time	11.4 seconds

Postaeration

number of units	2
type	diffused aeration
basin dimensions	4 ft. x 43 ft. x 10 ft. SWD
aeration capacity	55 SCFM per basin

Flow Measurement

type	Parshall flume
number of units	3
locations	2 @ influent flow splitter 1 @ postaeration effluent
capacity	0.23 - 11.0 MGD (12 in. throat)
type	Palmer - Bowlus flume
number of units	2
location	secondary flow splitter
capacity	0.72 - 5.5 MGD

Sludge Return/Waste Pumps

number of units	2
type	plunger positive displacement w/variable output
capacity	61.2 gpm @ 160 ft. TDH at max. stroke

Gravity Sludge Thickener

number of units	1
basin dimensions	30 ft. diameter x 10.25 ft. SWD
volume	59,500 gallons
design detention time	26 hours

Anaerobic Digesters

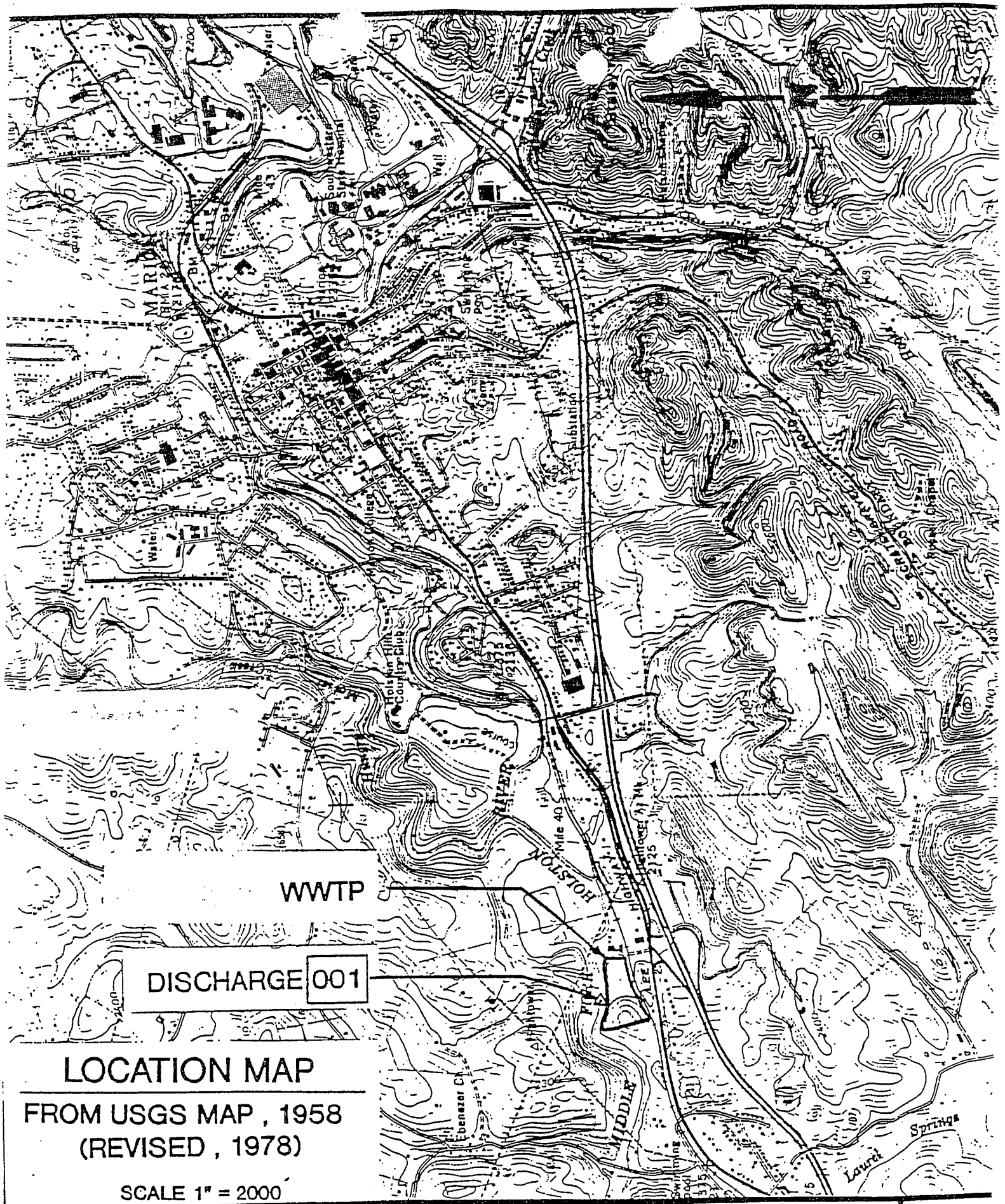
number of units	2 (1 primary, 1 secondary)
digester dimensions	50 ft. diameter x 25 ft. SWD
volume	384,600 gallons each
design detention time	19 days per unit
volatile solids loading	118 lb vs/1000 $ft.^3$
mixing	both units are completely mixed using one (1) screw-centrifugal, V-belt drive pump (150 gpm @ 12.6 ft. TDH) gas mixing system (perth type) on primary unit
covers	floating
heating	digester gas or oil-fired boiler with heat exchanger
other	secondary digester can function as primary

Sludge Dewatering

method	belt filter press
number of units	1
capacity	44 gpm @ 5% total solids w/output of 22% total solids dewatered cake
feed pump	one (1) two-stage, progressing cavity, positive displacement, variable speed pump (30-90 gpm @ 88 ft. TDH, 292 rpm max)

Other

non-potable water pumps and system, froth control pumps, polymer feed system for belt press, outfall, and fully-equipped laboratory.



LOCATION MAP

FROM USGS MAP , 1958
(REVISED , 1978)

SCALE 1" = 2000'

Dewberry & Davis

626 South Main Street
Marion, VA 24354

Architects
Engineers

MARION
WASTEWATER TREATMENT
PLANT

Date
SEPT. 19

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION
Water Quality Assessments and Planning
629 E. Main Street P.O. Box 10009 Richmond, Virginia 23240

SUBJECT: Flow Frequency Determination
Marion WWTP - VA#0086304

TO: Fred Wyatt, SWRO

FROM: Paul E. Herman, P.E., WQAP

DATE: January 23, 2001

COPIES: Ron Gregory, Charles Martin, File

This memo supersedes my February 29, 1996, memo to you concerning the subject VPDES. This memo includes updated flow frequency data.

The Marion WWTP discharges to the M.F. Holston River near Marion, VA. Stream flow frequencies are required at this site for use by the permit writer in developing effluent limitations for the VPDES permit.

The USGS operated a continuous record gage on the M.F. Holston River at Seven Mile Ford, VA (#03474000) from 1942 to 1981, 1987 to 1989, and 1996 to present. The gage is located at the U.S. Route 11 bridge in Seven Mile Ford, VA. The flow frequencies for the gage and the discharge point are presented below. The values at the discharge point were determined by drainage area proportions and do not address any withdrawals, discharges, or springs lying between the gage and the discharge point.

M.F. Holston River at Seven Mile Ford, VA (#03474000):

Drainage Area = 132 mi^2

1Q10 = 22 cfs — High Flow 1Q10 = 28 cfs
7Q10 = 27 cfs — High Flow 7Q10 = 32 cfs
30Q5 = 30 cfs — HM = 76 cfs
Annual Average = 163 cfs

M.F. Holston River at discharge point:

Drainage Area = 101.87 mi^2

1Q10 = 17 cfs (11 mgd) — High Flow 1Q10 = 22 cfs (14.2 mgd)
7Q10 = 21 cfs (13.6 mgd) — High Flow 7Q10 = 25 cfs (16.2 mgd)
30Q5 = 23 cfs (14.9 mgd) — HM = 59 cfs (38.1 mgd)
Annual Average = 126 cfs (81.4 mgd)

The high flow months are December through May. If you have any questions concerning this analysis, please let me know.

1.7 MGD Water Treatment Plant withdrawal must be subtracted from these values.

Corrected Values Are:

1Q10 = 9.3 MGD
7Q10 = 11.9 MGD
30Q5 = 13.2 MGD
30Q10 = 17.7 MGD

High Flow 1Q10 = 12.5 MGD
High Flow 7Q10 = 14.5 MGD
HM = 36.4 MGD
HF 30Q10 = 36.4 MGD

Table 1.
TMP Summary Test Results
Town of Marion WWTP
VPDES Permit No. VA0086304
07/12/06 - 07/11/11 Report Due by October 10th each year
NOEC Criteria is 16% or TU_c 6.25

TEST DATE		TEST TYPE/ORGANISM	LC_{50}	NOEC	% Survival	NOTES	Lab
08/01/06-08/08/06 Received 09/11/06	AN-1	Chronic P. promelas	NA	100% S 60.8% G	100%	Pass	Olver
08/02/06-08/04/06 Received 09/11/06		Acute P. promelas	>100%	NA	100%	Pass	Olver
08/01/06-08/06/06 Received 09/11/06		Chronic C. dubia	NA	100% S&R	100%	Pass	Olver
08/02/06-08/04/06 Received 09/11/06		Acute C. dubia	>100%	NA	100%	Pass	Olver
08/27/07-09/03/07 Received 10/11/07	AN-2	Chronic P. promelas	NA	100% S&G	97.5%	Pass	Olver
08/29/07-08/31/07 Received 10/11/07		Acute P. promelas	>100%	NA	100%	Pass	Olver
08/27/07-09/02/07 Received 10/11/07		Chronic C. dubia	NA	100% S 60.8% R	90%	Pass	Olver
08/29/07-08/31/07 Received 10/11/07		Acute C. dubia	>100%	NA	100%	Pass	Olver
09/02/08-09/09/08 Received 10/10/08	AN-3	Chronic P. promelas	NA	100% S 22.5%G	100%	Pass	Olver
07/30/08-08/01/08 Received 10/10/08		Acute P. promelas	>100%	NA	80%	Pass	Olver
09/02/08-09/09/08 Received 10/10/08		Chronic C. dubia	NA	100% S 100% R	100%	Pass	Olver
07/30/08-08/01/08 Received 10/10/08		Acute C. dubia	>100%	NA	95%	Pass	Olver

Table 1.
TMP Summary Test Results
Town of Marion WWTP
VPDES Permit No. VA0086304
07/12/06 - 07/11/11 Report Due by October 10th each year
NOEC Criteria is 16% or TU_c 6.25
Page 2

TEST DATE		TEST TYPE/ORGANISM	LC_{50}	NOEC	% Survival	NOTES	Lab
07/28/09-08/04/09 Received 10/08/09	AN-4	Chronic P. promelas	NA	100% S 100 % G	75%	Pass	CBI
07/29/09-07/31/09 Received 10/08/09		Acute P. promelas	>100%	NA	100%	Pass	CBI
07/28/09-08/03/09 Received 10/08/09		Chronic C. dubia	NA	100% S&R	100%	Pass	CBI
07/29/09-07/31/09 Received 10/08/09		Acute C. dubia	>100%	NA	100%	Pass	CBI
07/13/10-07/20/10 Received 10/14/10	AN-5	Chronic P. promelas	NA	100% S 100 % G	93%	Pass	Olver
07/14/10-07/16/10 Received 10/14/10		Acute P. promelas	>100%	NA	100%	Pass	Olver
07/13/10-07/19/10 Received 10/14/10		Chronic C. dubia	NA	100% S&R	100%	Pass	Olver
07/14/10-07/16/10 Received 10/14/10		Acute C. dubia	>100%	NA	100%	Pass	Olver

%Survival is the percent survival in 100% effluent at the end of the test period.
All samples are 24 hour flow proportional composites.

ABBREVIATIONS:
AN = Annual tests
QT = Quarterly test
Olver = Olver Laboratories
CBI = Coastal Bioanalysts, Inc.
R = Reproduction
G = Growth
S = Survival

COM .ONWEALTH OF VIRC .IA
DEPARTMENT OF ENVIRONMENTAL QUALITY

Water Division - Office of Water Permit Support
629 East Main Street Richmond, Virginia 23219

M E M O R A N D U M

Subject: Marion STP - Ammonia limits
To: Fred Wyatt
From: M. Dale Phillips
Date: April 25, 1996
Copies:

Situation: The current limits were based on old (before the current standards were adopted in 1992) criteria and guidance. They are very stringent and difficult to attain. The question is can they be relaxed?

There are two restrictions in the law and regulations that may limit our ability to relax these limits:

> Antibacksliding - since the discharger has installed and operated nitrification facilities and has demonstrated compliance with the existing limits, the antibacksliding regulations may limit our ability to modify these limits. A relaxation would be acceptable based on new data that was not available at the time of permit issuance (the 7Q10 has changed significantly and new temperature and pH data are now available).
>
> Antidegradation - Originally the stream was unimpacted. The ammonia limits were placed in the first permit and as a result the STP has complied with them since start up. The available data indicates that the stream was, and still is, a tier 2 stream to which antidegradation must be applied.

Regardless of antibacksliding considerations and any relaxation that may be allowable according to those regulations, the required application of our antidegradation policy will severely restrict what we can do in this situation.

I can identify only one alternative that is allowable - issue the permit in compliance with section 303(d)(4) of the Clean Water Act and with our antidegradation policy. This section of the Act basically says that permit limits may be revised if the standards will still be attained and if the revised limits are subject to and consistent with the antidegradation policy.

If a permit revision is in compliance with section 303(d)(4) then antibacksliding does not prevent a modification of its limits (see section 402(o)(1) of the Act).

The following approach complies with our antidegradation policy and is acceptable according to federal law:

1. You have demonstrated (by use of MIX.EXE) that complete mix equations are appropriate in this case. You can neglect

acute toxicity since chronic toxicity will be the controlling factor relative to the permit limits.

2. Calculate the existing instream concentration by application of complete mix equations. Use the existing limit, the new 7Q10 and the STP design flow. Assume the background is zero.

3. Calculate the chronic standard for the stream using the appropriate temperature and pH.

4. Calculate the unallocated assimilative capacity. This is the difference between the existing instream concentration and the chronic standard concentration.

5. Calculate the antidegradation baseline according to our antidegradation policy. This is the sum of the current instream concentration and 25% of the unused capacity.

6. Use the antidegradation baseline instead of the standard to calculate the WLAc.

7. Run the WLA.EXE program with one high fictitious data point and the WLAc from step 6 to force the program to calculate limits that will comply with the antidegradation baseline.

8. In accordance with the EPA's requirements for POTWs write the limits as weekly and monthly averages.

The limits that result are:

1. sufficient to maintain the instream concentrations of ammonia well below the requirements of the water quality standards.

2. subject to and in accordance with our antidegradation policy.

3. in compliance with section 303(d)(4) of the Clean Water Act and are, therefore, not subject to antibacksliding restrictions.

This protocol may be applied to either single or tiered limits.

EPA has indicated that a new limits page(s) and the supporting calculations are all that are necessary to allow removal of the objection. I would suggest you also send a copy of this memo as justification for the new limits.

Note: The baseline you identify in step 5 should be preserved somewhere for reference because no further degradation can be allowed in the future without Board action.

Fred,

I ran this by EPA and they said they would accept it.

All they need is a new limits page(s) and the calculations and they will remove the objection.

I would suggest that you look at both single and tiered limits and go with the less stringent. I am sorry I didn't have time to do the calculations but you can probably do them faster than I can anyway because I would have to find data that you know by heart by now.

You can fax it to EPA or you can E-mail it to me and I will print and fax it to EPA.

Fred Wyatt SWRO

TABLE II

```
Effluent flow     =  3.4   MGD
Stream 7Q10 flow =  11.87  MGD          Stream 1Q10 flow =  9.28   MGD
Width             =  30    ft           Slope (ft/ft)    =  .00316
Bottom scale      =  5
Channel has normal irregularities

C H R O N I C     R E S U L T S
   7Q10 depth          =     1.37 ft
   7Q10 velocity       =     0.57 ft/sec =    9.4 mi / day
   Mixing length @ 7Q10 =        403 ft   =
   Residence time =     0.008 days
 **COMPLETE MIX MAY BE USED FOR THE CHRONIC WLA**
  Percent of 7Q10 to be used for WLAc = 100%

A C U T E   R E S U L T S
   1Q10 depth          =     1.22 ft
   1Q10 velocity       =     0.53 ft/sec =    8.7 mi / day
   Mixing length @ 1Q10 =        446 ft   =
   Residence time  =     0.232 hours
 **COMPLETE MIX MAY BE USED FOR THE ACUTE WLA**
  Percent of 1Q10 to be used for WLAa = 100%

                                   Use print screen for hard copy
C:\MIXPROG>
```

```
.0
         PARAMETER                                  NOBS       AVE        MAX
1IN  BEG-DATE    END-DATE
    10  WATER       TEMP       CENT                 23       11.4       19.6
3.1  92/06/24    96/02/14
?RINT DETAILS FOR THIS PARAMETER ? (YES OR NO)
Y
/HAT RESTRICTIONS ??
:NTER RESTRICTIONS OR "GO"
GO
 6CMFH045.72
                              STORET System
36 51 11.0 081 28 55.0  4
RT 693 BRIDGE OFF U.S. RT 11 APPROX 30 FT DWNST
51173 VIRGINIA            SMYTH
)4-TENNESSEE                040600
5-TENNESSEE + BIG SANDY
?1VASWCB 06010101                      /TYPA/AMBNT/STREAM
        920201      DEPTH     0
 INDEX
 MILES

                                  00010
  DATE    TIME    DEPTH          WATER
  FROM     OF                     TEMP
    TO    DAY     FEET           CENT

)2/06/24 1222     0               15.0
)2/08/05 1000     0               14.1
)2/08/05 1000     1               14.1
)2/10/19 1137     0                9.1
)2/12/15 1248     0                5.4
)3/02/08 1242     0                7.6
)3/04/19 1100     0                9.7
)3/06/29 0940     0               17.4
)3/08/19 0922     0               17.5
)3/10/28 0842     0               10.1
)3/12/27 0918     0                3.1
)4/02/08 0848     0                5.2
)4/04/25 0951     0               13.3
)4/06/22 1221     0               19.6
)4/08/15 1248     0               19.1
)4/10/20 0958     0               13.3
)4/12/08 0953     0                8.9
)5/03/15 0941     0               10.2
)5/04/26 1039     0                9.9
)5/06/29 1025     0               17.7
)5/10/11 0836     0               12.8
)5/12/12 1207     0                3.2
)6/02/14 1127     0                5.8
:NTER PARM CODE, "NEXT STATION", OR "ALL"
400
         PARAMETER                                  NOBS       AVE        MAX
1IN  BEG-DATE    END-DATE
   400    PH                        SU                 23      7.74       8.61       7
.14  92/06/24    96/02/14
?RINT DETAILS FOR THIS PARAMETER ? (YES OR NO)
Y
/HAT RESTRICTIONS ??
?NTER RESTRICTIONS OR "GO"
```

Based on two other nearby gauging stations with longer periods of record, on the Middle Fork of Holston River, a 90th percentile temperature of 22 °C seems appropriate.

STORET System

36 51 11.0 081 28 55.0 4
RT 693 BRIDGE OFF U.S. RT APPROX 30 FT DWNST
51173 VIRGINIA SMYTH
04-TENNESSEE 040600
5-TENNESSEE + BIG SANDY
21VASWCB 06010101 /TYPA/AMBNT/STREAM
920201 DEPTH 0
INDEX
MILES

DATE FROM TO	TIME OF DAY	DEPTH FEET	00400 PH SU
92/06/24	1222	0	7.92
92/08/05	1000	0	~~8.61~~ Fluke
92/08/05	1000	1	~~8.61~~ Fluke
92/10/19	1137	0	7.66
92/12/15	1248	0	8.21
93/02/08	1242	0	8.28
93/04/19	1100	0	8.07 ← 90th. percentile
93/06/29	0940	0	7.62
93/08/19	0922	0	7.65
93/10/28	0842	0	7.36
93/12/27	0918	0	7.23
94/02/08	0848	0	7.14
94/04/25	0951	0	7.86
94/06/22	1221	0	7.54
94/08/15	1248	0	7.86
94/10/20	0958	0	7.22
94/12/08	0953	0	7.30
95/03/15	0941	0	8.00
95/04/26	1039	0	7.82
95/06/29	1025	0	7.38
95/10/11	0836	0	7.36
95/12/12	1207	0	7.73
96/02/14	1127	0	7.49

ENTER PARM CODE, "NEXT STATION", OR "ALL"
end
READY
logoff
TG:S511 LOGGED OFF FRIDAY 04/26/96 AT 13:27:26
PU: TCB :01.65, SRB :00.07, TOTAL :01.72
O: DISK 258, TERM 210, TOTAL 468
OST: CPU $.24, I/O $.06, TOTAL $.30
HE CPU TIMES HAVE BEEN NORMALIZED TO THE PROCESSING SPEED OF
HE ES9021-900 SYSTEM.

FORMULAS USED IN THE CALCULATION OF CHRONIC CRITERIA VALUES FOR AMMONIA IN FRESHWATER

[The 4-DAY average concentration of ammonia (in mg/L as un-ionized NH3) calc. as follows].

D.- CHRONIC AMMONIA STANDARD FOR WARMWATER HABITATS - TROUT/ OTHER SENSITIVE COLDWATER SPECIES ABSENT

ENTER STREAM TEMPERATURE 22.00 ^{o}C

ENTER STREAM pH 8.07 S.U.

FORMULA: CHRONIC (un-ionized) NH3 CRITERIA= 0.80/ FT/ FpH/ RATIO

CHRONIC un-ionized AMMONIA CRITERIA= 0.06

where: 1) FT = Final Temperature = $10^{0.03(20 - TCAP)}$; TCAP < T < 30 ^{o}C

TCAP = 20 ^{o}C since trout, coldwater species absen

or = $10^{0.03(20 - T)}$; 0 < T < TCAP

FT = 1.00

2) FpH = Final pH = 1 ; if 8.0 < pH < 9.0

or = $(1 + 10^{7.4 - pH})/1.25$; if 6.5 < pH < 8.0

FpH = 1.00

3) RATIO = 13.5 ; if 7.7 < pH < 9.0

or RATIO = $20.25 \times (10^{7.7 - pH}) / (1 + 10^{7.4 - pH})$; if 6.5< pH < 7.7

RATIO = 13.50

4) Fraction of un-ionized Ammonia = $1/(10^{pka - pH} + 1)$

pka = 0.09018 + (2729.92/(273.2 + Temperature ^{o}C))

pka = 9.34

Fraction of un-ionized Ammonia = 0.05

5) Total Ammonia Criteria = Calc. Un-ionized Criteria/ Fraction of Un-ionized NH3

Total Ammonia Criteria = 1.16

6) NH3-N Criteria Value = 1.16 X .822 = 0.95 mg/L

FORMULAS USED IN THE CALCULATION OF ACUTE CRITERIA VALUES FOR AMMONIA IN FRESHWATER

[The one hour average concentration of ammonia (in mg/L as un-ionized NH3) calc. as follows].

B.- ACUTE AMMONIA STANDARD FOR WARMWATER HABITATS - TROUT/ OTHER SENSITIVE COLDWATER SPECIES ABSENT

ENTER STREAM TEMPERATURE 22.00 ^{0}C

ENTER STREAM pH 8.07 S.U.

FORMULA: ACUTE (un-ionized) AMMONIA CRITERIA= 0.52/ FT/ FpH/ 2

ACUTE un-ionized AMMONIA CRITERIA = 0.30

where: 1) FT = Final Temperature = $10^{0.03(20 - TCAP)}$; TCAP < T < 30 ^{0}C

TCAP = 25 ^{0}C since trout, coldwater species absen

or = $10^{0.03(20 - T)}$; 0 < T < TCAP

FT = 0.87

2) FpH = Final pH = 1 ; if 8.0 < pH < 9.0

or = $(1 + 10^{7.4 - pH})/1.25$; if 6.5 < pH < 8.0

FpH = 1.00

3) Fraction of un-ionized Ammonia = $1/(10^{pka - pH} + 1)$

pka = 0.09018 + (2729.92/(273.2 + Temperature ^{0}C))

pka = 9.34

Fraction of un-ionized Ammonia = 0.05

4) Total Ammonia Criteria = Calc. Un-ionized Criteria/ Fraction of Un-ionized NH3

Total Ammonia Criteria = 5.83

5) NH3-N Criteria Value = 5.83 X .822 = 4.79 mg/L

Recalculation of Total Ammonia Nitrogen Limits

Facility Name: Marion WWTP
VPDES Permit No: VA0086304

NH_3-N limits are derived from the ammonia tables or formulas in the Water Quality Standards. Human Health standards are not applicable for ammonia.

Based on the formulas in the Water Quality Standards, Total Ammonia standards were calculated for a year round limit.

90th. percentile pH = 8.07 90th. percentile temp. = 22° C

The calculated ammonia nitrogen water quality standards (WQS) are:

Acute WQS = (5.83 x 0.822) mg/l = 4.79 mg/l

Chronic WQS = (1.16 x 0.822) mg/l = 0.95 mg/l

Q_e = Design Flow of STP(MGD) = 3.4

Q_s = Critical Flow (1Q10 for Acute, 7Q10 for Chronic)

Q_{s-1} = 1Q10 Flow (MGD) = 9.28
Q_{s-1w} = 1Q10 High Flow (MGD) = 12.52
Q_{s-7} = 7Q10 Flow (MGD) = 11.87
Q_{s-7w} = 7Q10 High Flow (MGD) = 14.46

Recalculation of Total Ammonia Nitrogen Limits (continued)

The dry and wet seasons ammonia nitrogen limits in the existing permit are also the existing wasteload allocations. The existing dry season wasteload allocation is 2.6 mg/l.

Chronic:

Chronic Water Quality Standard = 0.95 mg/l

X = Existing permitted instream concentration

WLA_c = Chronic Wasteload Allocation

$WLA_c = [(X)(Q_{s-7} + Q_e) - Q_{s-7}(\text{background instream } NH_{3-N})]/Q_e$

$WLA_c = 2.6 \text{ mg/l} = [(X)(11.87 + 3.4) - 0]/3.4 \text{ mg/l} = (X)(4.49) \text{ mg/l}$

X = 0.58 mg/l

Remaining allocation = (0.95 - 0.58) mg/l = 0.37 mg/l

Allowable increase in allocation = 25%(0.37) mg/l = .093 mg/l

New allowable instream concentration = (0.58 + 0.093 mg/l

New allowable instream concentration = 0.673 mg/l

New WLA_c = [(0.67)(11.87 + 3.4) - 0]/3.4 = 3.0 mg/l

Acute:

Acute Water Quality Standard = 4.79 mg/l

X = Existing permitted instream concentration

WLA_a = Acute Wasteload Allocation

$WLA_a = [(X)(Q_{s-1} + Q_e) - Q_{s-1}(\text{background instream } NH_{3-N})]/Q_e$

$WLA_a = 2.6 \text{ mg/l} = [(X)(9.28 + 3.4) - 0]/3.4 \text{ mg/l} = (X)(3.73)$

X = 0.70 mg/l

Remaining allocation = (4.79 - 0.70) mg/l = 4.09 mg/l

Allowable increase in allocation = 25%(4.09) mg/l = 1.02 mg/l

New allowable instream concentration = (0.70+ 1.02) mg/l

New allowable instream concentration = 1.72 mg/l

New WLA_a = [(1.72)(9.28 + 3.4) - 0]/3.4 = 6.4 mg/l

Analysis of the Marion WW effluent data for Ammoni. Nitrogen

The statistics for Ammonia Nitrogen are:

Number of values	=	1
Quantification level	=	.2
Number < quantification	=	0
Expected value	=	9
Variance	=	29.16001
C.V.	=	.6
97th percentile	=	21.90076
Statistics used	=	Reasonable potential assumptions - Type 2 data

The WLAs for Ammonia Nitrogen are:

Acute WLA	=	6.4
Chronic WLA	=	3
Human Health WLA	=	----

The limits are based on chronic toxicity and 2 samples/month.

Maximum daily limit	=	4.387724
Average monthly limit	=	3.568028

It is recommended that only the maximum daily limit be used.

DATA
9

STREAM INSPECTION REPORT FORM

Discharge Name: Marion WWTP

Location: Intersection of Exit 15 of I-81 & Rt. 11

General Stream Information:

Stream Name: Middle Fork Holston River

Topographic Map (attach copy): Marion Quad.

Basin: Tennessee - Big Sandy River Section: 5 Class: IV Special Standards: None
Holston River Subbasin

Are the standards for this stream violated due to natural causes? (Y/N) N

Is this stream correctly classified? (Y/N) Y

If "N", what is the correct classification? _____

Additional Discharges Information:

Is there a discharger within 3 miles upstream of the proposal? (Y/N) N

Does antidegradation apply to this analysis? (Y/N) N

Any dams in stream section being modeled? (Y/N) N

Notes:

This model is for a completely new 3.4 MGD facility which will replace the existing 1.7 MGD Marion STP, which is approximately 1.6 miles upstream of the proposed 3.4 MGD facility.

By memo dated February 4, 1988 (copy attached), Steve Williams, OWRP, supplied a Q7-10 flow at the existing Marion STP, which was used in a model (approved 5/17/88) for an upgraded treatment facility at the existing site. This Q7-10 flow is 10.71 MGD. However, the 3.0 MGD withdrawal of the water treatment plant, upstream of the STP, must be subtracted from this value, leaving a Q7-10 flow of 7.71 MGD. Additional tributary flows result in a Q7-10 at the point of discharge of the proposed new facility of 8.949. Using a flow factor of 0.20 cfs/mi.^{2}, this Q7-10 relates to an effective drainage area of 69.2 mi.^{2}

Inspected by Jud M. Wyatt Date 12/19/90 Region SCRO

Segment 1

REGIONAL MODELING SYSTEM Version 3.0 (4/90)

STREAM INSPECTION REPORT FORM

(Fill In This Page for Each Segment To Be Modeled)

Specific Stream Information From Field Inspection: Segment Number 1

Reason for Defining Segment: Tributary at End 2 Physical Change at End ____
Discharge at End ____ End of Model ____

Length of Segment (mi.) 0.6

Estimated Average Width of Section (ft.) 80

Estimated Average Depth of Section (ft.) in Stream Center 5

Estimated Average Velocity of Section (ft/sec) 0.5

Estimated Flow in the Segment (MGD) 129.3

General Type of Cross Section in Segment: Rectangular ____ Triangular ____ Deep Narrow U ____ Wide Shallow Arc X
Irregular ____ No Defined Channel ____

General Channel Characteristics of Segment:
Mostly Straight ____ Moderately Meandering X Severely Meandering ____ No Defined Channel ____

Does the stream have a pool and riffle character? (Y/N) Y

If "Y": % of length that is pools 50 Average depth of pools (ft) 6

% of length that is riffles 50 Average depth of riffles (ft) 3

Bottom: Sand ____ Silt ____ Gravel ____ Small Rock ____ Large Rock X Boulders ____

Sludge Deposits: None X Trace ____ Light ____ Heavy ____

Plants: Rooted: None ____ Few X Light ____ Heavy ____

Algae: None ____ Film on Edges Only X Film on Entire Bottom ____

Does the water have an evident green color? (Y/N) N

Tributary: (Fill in if a tributary enters at the end of the segment)

Tributary Name: Unnamed

Width (ft) 2 Depth (ft) 0.5 Estimated Flow (MGD) 12.6

Any evident Water Quality problems in the Trib.? (Y/N) N

If "Y", explain: ____

Discharges: (Fill in if a discharge enters at the end of the segment)

Discharge Name: ____

Any evident problems caused by this discharge? (Y/N) ____

If "Y", explain: ____

Segment 2

REGIONAL MODELING SYSTEM Version 3.0 (4/90)

STREAM INSPECTION REPORT FORM

(Fill In This Page for Each Segment To Be Modeled)

Specific Stream Information From Field Inspection: Segment Number 2

Reason for Defining Segment: Tributary at End ____ Physical Change at End ____
Discharge at End ____ End of Model 2

Length of Segment (mi.) 1.1

Estimated Average Width of Section (ft.) 80

Estimated Average Depth of Section (ft.) in Stream Center 6

Estimated Average Velocity of Section (ft/sec) 0.5

Estimated Flow in the Segment (MGD) 1.55

General Type of Cross Section in Segment: Rectangular ____ Triangular ____ Deep Narrow U ____ Wide Shallow Arc X
Irregular ____ No Defined Channel ____

General Channel Characteristics of Segment:
Mostly Straight ____ Moderately Meandering X Severely Meandering ____ No Defined Channel ____

Does the stream have a pool and riffle character? (Y/N) Y

If "Y": % of length that is pools 50 Average depth of pools (ft) 7

% of length that is riffles 50 Average depth of riffles (ft) 3

Bottom: Sand ____ Silt ____ Gravel ____ Small Rock ____ Large Rock X Boulders ____

Sludge Deposits: None X Trace ____ Light ____ Heavy ____

Plants: Rooted: None ____ Few X Light ____ Heavy ____

Algae: None ____ Film on Edges Only X Film on Entire Bottom ____

Does the water have an evident green color? (Y/N) N

Tributary: (Fill in if a tributary enters at the end of the segment)

Tributary Name: _____

Width (ft) _____ Depth (ft) _____ Estimated Flow (MGD) _____

Any evident Water Quality problems in the Trib.? (Y/N) _____

If "Y", explain: _____

_____

_____

Discharges: (Fill in if a discharge enters at the end of the segment)

Discharge Name: _____

Any evident problems caused by this discharge? (Y/N) _____

If "Y", explain: _____

_____

_____

DATA PREPARATION WORKSHEET

(This Page is Needed Once for Each Model)

Use this form to assist in the preparation of the model input data. The form is arranged so that the data appears in the order needed by the model. Once the form is complete, you may input the data for a model run by simply entering the numbers and other data that you have put in the right hand column. There is some guidance provided here, but for detailed guidance refer to the manual or call headquarters for assistance.

Some of the input data are character, such as names; some are codes, such as "Y", "N" or "3"; and some are actual numeric data such as "5.6". Be careful to enter the correct item called for. Some of the lines below may be blank depending on choices. Leave them blank and do not input data for blank lines when running the model. Miscellaneous items that are not in the right most column are intermediate guidelines, not input data.

Site Inspection Performed? (Y/N) (12/19/90)	Y
Name of Receiving Stream	Middle Fork Holston River
River Basin	Tennessee-Big Sandy
Section	5
Classification	IV
Are Standards Violated Due to Natural Causes? (Y/N)	N
Class and Standards Appropriate for the Stream? (Y/N)	Y
Is There a Dam in the Reach to be Modeled? (Y/N)	N
Is There a Discharge Within 3 Miles of Model Start? (Y/N)	N
If "Y": Flow of Upstream Discharge (MGD)	
BOD5 at Model Start (Mg/l)	
TKN at Model Start (Mg/l)	
D.O. at Model Start (Mg/l)	
Name of Discharge Being Modeled	Marion STP
Proposed Flow (MGD)	3.4
Proposed BOD5 (Mg/l)	25
Proposed TKN (Mg/l)	20
Proposed D.O. (Mg/l)	6.5
Number of Segments to be Modeled (Determined during your field inspection and based on the physical characteristics of the stream. See "Reason for Defining Segment" on Page 2)	2
7Q10 Estimation Method Code (Two methods are provided: 1 = Drainage Area Comparison; 2 = Flow Comparison You may compare drainage areas or observed flows at the model site with a gauge).	1
Name of Gauge Used to Estimate 7Q10	Middle Fork Holston River at Steenmile Ford, VA
If Method 1: Gauge Drainage Area (Sq.Mi.)	~~132~~ 191
Gauge 7Q10 (MGD)	69.2
Drainage Area at Discharge (Sq.Mi.)	
If Method 2: Gauge 7Q10 (MGD)	
Observed Flow at Gauge (MGD)	
Observed Flow at Discharge Point (MGD)	
Is the Stream a Dry Ditch? (Y/N)	N
Does Antidegradation Apply? (Y/N)	N
Allocation Temperature for the Model (°C) (Obtain a STORET retrieval for the nearest monitoring station to the discharge. Enter the 90th percentile temperature of the STORET data for the period being modeled.)	26

Segment 1

DATA PREPARATION WORKSHEET

(This Page is Needed for Each Separate Segment Being Modeled)

The first segment starts at the discharge being modeled and segment ends are defined according to the field inspection. Normally a distance of 3 to 5 miles is sufficient for a single discharge model. Dilution by a major tributary is often sufficient to allow the model to be ended. You should, however, inspect sufficient stream length to allow you to increase the number of segments or total model length if the model shows that the critical area is outside your initial estimates. This will allow the addition of segments and the preparation of a new data set without the necessity to reinspect the stream. As a general guideline, the higher the percentage the discharge is of the total stream flow the longer the distance you will have to model. Ten miles should suffice for practically all situations.

Segment Definition Code 1

Reasons for Defining a Segment:

1 = A Tributary Enters at the Segment End
2 = A Significant Physical Change Occurs at Segment End
3 = Another Discharge Enters at Segment End
4 = The Model Ends

Length of Segment (Mi.) 0.6

Based on the stream characteristics you observed, use your judgement and the flow ratio below to estimate the segment's physical characteristics at the 7Q10 flow condition. Note that the model checks to see if cross sectional area times velocity is equal to the flow (V=QA). It checks to see if the drainage area increases in the downstream direction and it checks to see if the elevation decreases in the downstream direction. You will run into trouble if the estimates you make below are unreasonable.

(a): Enter Flow Estimated During Inspection (MGD) 129.3
(b): Enter 7Q10 at Model Start (Include Discharge) (MGD) 12.35
(c): Calculate the Flow Ratio (a/b) 10.47

Estimated 7Q10 Width (Ft.) 30
Estimated 7Q10 Depth (Ft.) 1.6
Estimated 7Q10 Velocity (ft/sec) 0.4

Continuity Check:
(a): Multipy: Width x Depth x Velocity x .6463 30 x 1.6 x .4 x .6463 = 12.4
(b): Enter 7Q10 at Model Start (Include Discharge) (MGD) 12.35

If the two numbers above differ by much, you have made some sort of error. Review your data and revise your estimates.

Drainage Area at the Beginning of This Segment (Sq.Mi.) 69.2
Drainage Area at the End of This Segment (Sq.Mi.) 69.2

(Omit the drainage area of any tributaries that are included in this segment under the "Tributary at End" section below).

Elevation at the Beginning of This Segment (Ft.) 2059
Elevation at the End of This Segment (Ft.) 2049

The following data is based on the field inspection and you should estimate what the overall "average" segment will look like at the 7Q10 flow condition. You enter the number code that best describes what you saw for this segment.

Type of Cross Section 4

1 = Rectangular; 2 = Triangular; 3 = Deep Narrow U; 4 = Wide Shallow Arc;
5 = Irregular; 6 = No Defined Channel

Segment 2

DATA PREPARATION WORKSHEET

(This Page is Needed for Each Separate Segment Being Modeled)

The first segment starts at the discharge being modeled and segment ends are defined according to the field inspection. Normally a distance of 3 to 5 miles is sufficient for a single discharge model. Dilution by a major tributary is often sufficient to allow the model to be ended. You should, however, inspect sufficient stream length to allow you to increase the number of segments or total model length if the model shows that the critical area is outside your initial estimates. This will allow the addition of segments and the preparation of a new data set without the necessity to reinspect the stream. As a general guideline, the higher the percentage the discharge is of the total stream flow the longer the distance you will have to model. Ten miles should suffice for practically all situations.

Segment Definition Code 4

Reasons for Defining a Segment:

1 = A Tributary Enters at the Segment End
2 = A Significant Physical Change Occurs at Segment End
3 = Another Discharge Enters at Segment End
4 = The Model Ends

Length of Segment (Mi.) 1.1

Based on the stream characteristics you observed, use your judgement and the flow ratio below to estimate the segment's physical characteristics at the 7Q10 flow condition. Note that the model checks to see if cross sectional area times velocity is equal to the flow (V=QA). It checks to see if the drainage area increases in the downstream direction and it checks to see if the elevation decreases in the downstream direction. You will run into trouble if the estimates you make below are unreasonable.

(a): Enter Flow Estimated During Inspection (MGD) 15.5
(b): Enter 7Q10 at Model Start (Include Discharge) (MGD) 13.22
(c): Calculate the Flow Ratio (a/b) 11.72

Estimated 7Q10 Width (Ft.) 32
Estimated 7Q10 Depth (Ft.) 1.6
Estimated 7Q10 Velocity (ft/sec) 0.4

Continuity Check:
(a): Multipy: Width x Depth x Velocity x .6463 (32)(1.6)(0.4)(.6463) = 13.24
(b): Enter 7Q10 at Model Start (Include Discharge) (MGD) 13.22

If the two numbers above differ by much, you have made some sort of error. Review your data and revise your estimates.

Drainage Area at the Beginning of This Segment (Sq.Mi.) 69.2
Drainage Area at the End of This Segment (Sq.Mi.) 69.82

(Omit the drainage area of any tributaries that are included in this segment under the "Tributary at End" section below).

Elevation at the Beginning of This Segment (Ft.) 2049
Elevation at the End of This Segment (Ft.) 2022

The following data is based on the field inspection and you should estimate what the overall "average" segment will look like at the 7Q10 flow condition. You enter the number code that best describes what you saw for this segment.

Type of Cross Section 4

1 = Rectangular; 2 = Triangular; 3 = Deep Narrow U; 4 = Wide Shallow Arc;
5 = Irregular; 6 = No Defined Channel

Segment 1

DATA PREPARATION WORKSHEET

General Character of Stream — 2

1 = Mostly Straight; 2 = Moderately Meandering; 3 = Severely Meandering; 4 = No Defined Channel

Does This Segment Have a Pool and Riffle Character? (Y/N) — Y

If "Y": Percent of the Length of This Segment That is Pools ÷ 100 — .5

Percent of the Length of This Segment That is Riffles ÷ 100 — .5

Estimated Average Depth of the Pools (Ft.) — 2.4

Estimated Average Depth of the Riffles (Ft.) — 0.8

Check that this is reasonable with the overall depth you entered on previous page:

(a): Enter the 7Q10 Depth (Ft.) (from previous page) — 1.6

(b): Enter % Pool Length x Pool Depth — 120

(c): Enter % Riffle Length x Riffle Depth — 40

(d): Enter (b+c)/100 — 1.6

The values in (a) and (d) should be the same or very close.

General Bottom Type — 5

1 = Sand; 2 = Silt; 3 = Gravel; 4 = Small Rock; 5 = Large Rock; 6 = Boulders

Sludge Deposits — 1

1 = None; 2 = Trace; 3 = Light; 4 = Heavy

(This is organic sludge from an inadequate or malfunctioning STP. Do not confuse with silt deposits from other sources.)

Plants — 2

1 = None; 2 = Few; 3 = Light; 4 = Heavy

(These are submerged macrophytes or rooted plants in the waterway.)

Algae — 2

1 = None; 2 = Only on Edges; 3 = On Entire Bottom

(This is visually evident algae growth in the water, e.g.- green films, green filaments or green masses of algae attached to the bottom or in shallow parts of the bank.)

Does the Water Have an Evident Green Color? (Y/N) — N

(This is used as an indication of phytoplankton that one cannot normally see except by a general color imparted to the water by the floating cells.)

Tributary at End

If you defined the segment because there is a tributary at the end, complete the following:

Tributary Drainage Area (Sq.Mi.) — 6.75

Tributary Flow (MGD) (Tributary D.A. x Gauge 7Q10 / Gauge D.A.) — 0.87

NOTE! "Standard" background values will be used for this tributary (i.e. - BOD5 = 2 Mg/l, TKN = 0 Mg/l, D.O. = 90% of D.O. Saturation). If these values are not appropriate or the tributary has a discharge within 3 miles of the confluence with the stream being modeled, then redefine the segment as "3 - Discharge at End" and go to the next section.

Discharge at End

If you defined the segment because there is another discharge at the end, complete the following:

Discharge Name

Discharge Flow (MGD)

Discharge BOD5 (Mg/l)

Discharge TKN (Mg/l)

Discharge D.O. (Mg/l)

DATA PREPARATION WORKSHEET

General Character of Stream — 2

1 = Mostly Straight; 2 = Moderately Meandering; 3 = Severely Meandering; 4 = No Defined Channel

Does This Segment Have a Pool and Riffle Character? (Y/N) — Y

If "Y": Percent of the Length of This Segment That is Pools ÷ 100 — .5

Percent of the Length of This Segment That is Riffles ÷ 100 — .5

Estimated Average Depth of the Pools (Ft.) — 2.42

Estimated Average Depth of the Riffles (Ft.) — 0.8

Check that this is reasonable with the overall depth you entered on previous page:

(a): Enter the 7Q10 Depth (Ft.) (from previous page) — 1.6

(b): Enter % Pool Length x Pool Depth — 1.21

(c): Enter % Riffle Length x Riffle Depth — 0.4

(d): Enter (b+c)/100 — 1.61

The values in (a) and (d) should be the same or very close.

General Bottom Type — 5

1 = Sand; 2 = Silt; 3 = Gravel; 4 = Small Rock; 5 = Large Rock; 6 = Boulders

Sludge Deposits — 1

1 = None; 2 = Trace; 3 = Light; 4 = Heavy

(This is organic sludge from an inadequate or malfunctioning STP. Do not confuse with silt deposits from other sources.)

Plants — 2

1 = None; 2 = Few; 3 = Light; 4 = Heavy

(These are submerged macrophytes or rooted plants in the waterway.)

Algae — 2

1 = None; 2 = Only on Edges; 3 = On Entire Bottom

(This is visually evident algae growth in the water, e.g.- green films, green filaments or green masses of algae attached to the bottom or in shallow parts of the bank.)

Does the Water Have an Evident Green Color? (Y/N) — N

(This is used as an indication of phytoplankton that one cannot normally see except by a general color imparted to the water by the floating cells.)

Tributary at End

If you defined the segment because there is a tributary at the end, complete the following:

Tributary Drainage Area (Sq.Mi.) — _____

Tributary Flow (MGD) (Tributary D.A. x Gauge 7Q10 / Gauge D.A.) — _____

NOTE! "Standard" background values will be used for this tributary (i.e. - BOD5 = 2 Mg/l, TKN = 0 Mg/l, D.O. = 90% of D.O. Saturation). If these values are not appropriate or the tributary has a discharge within 3 miles of the confluence with the stream being modeled, then redefine the segment as "3 - Discharge at End" and go to the next section.

Discharge at End

If you defined the segment because there is another discharge at the end, complete the following:

Discharge Name — _____

Discharge Flow (MGD) — _____

Discharge BOD5 (Mg/l) — _____

Discharge TKN (Mg/l) — _____

Discharge D.O. (Mg/l) — _____

****

REGIONAL MODELING SYSTEM VERSION 3.2

****

MODEL SIMULATION FOR THE Town of Marion WWTP DISCHARGE

TO Middle Fork Holston River

THE SIMULATION STARTS AT THE Town of Marion WWTP DISCHARGE

********** PROPOSED PERMIT LIMITS **********

FLOW = 3.4 MGD cBOD5 = 25 Mg/L TKN = 20 Mg/L D.O. = 6 Mg/L

**** THE MAXIMUM CHLORINE ALLOWABLE IN THE DISCHARGE IS 0.040 Mg/L ****

* However, alternate disinfection required due to endangered species

---

THE SECTION BEING MODELED IS BROKEN INTO 2 SEGMENTS
RESULTS WILL BE GIVEN AT 0.1 MILE INTERVALS

********** BACKGROUND CONDITIONS **********

THE 7Q10 STREAM FLOW AT THE DISCHARGE IS 8.96454 MGD
THE DISSOLVED OXYGEN OF THE STREAM IS 6.852 Mg/L
THE BACKGROUND cBODu OF THE STREAM IS 5 Mg/L
THE BACKGROUND nBOD OF THE STREAM IS 0 Mg/L

********** MODEL PARAMETERS **********

SEG.	LEN. Mi	VEL. F/S	K2 1/D	K1 1/D	KN 1/D	BENTHIC Mg/L	ELEV. Ft	TEMP. °C	DO-S Mg/
1	0.60	0.536	10.000	0.700	0.300	0.000	2054.00	26.00	7.6
2	1.10	0.608	14.727	0.700	0.300	0.000	2035.50	26.00	7.6

(The K Rates shown are at 20°C ... the model corrects them for temperature.)

********** RESPONSE FOR SEGMENT 1 **********

TOTAL STREAMFLOW = 12.3645 MGD
(Including Discharge)

DISTANCE FROM HEAD OF SEGMENT (MI.)	TOTAL DISTANCE FROM MODEL BEGINNING (MI.)	DISSOLVED OXYGEN (Mg/L)	cBODu (Mg/L)	nBODu (Mg/L)
0.000	0.000	6.617	20.811	20.241
0.100	0.100	6.433	20.594	20.132
0.200	0.200	6.275	20.378	20.023
0.300	0.300	6.138	20.165	19.914
0.400	0.400	6.021	19.954	19.806
0.500	0.500	5.921	19.745	19.699
0.600	0.600	5.836	19.539	19.593

FOR THE TRIBUTARY AT THE END OF SEGMENT 1
FLOW = .87 MGD cBOD5 = 2 Mg/L TKN = 0 Mg/L D.O. = 6.8515 Mg/L

FLOW FROM INCREMENTAL DRAINAGE AREA = 0.0000 MGD

********** RESPONSE FOR SEGMENT 2 **********

TOTAL STREAMFLOW = 13.2345 MGD
(Including Discharge, Tributaries and Incremental D.A. Flow)

DISTANCE FROM HEAD OF SEGMENT (MI.)	TOTAL DISTANCE FROM MODEL BEGINNING (MI.)	DISSOLVED OXYGEN (Mg/L)	cBODu (Mg/L)	nBODu (Mg/L)
0.000	0.600	5.903	18.583	18.305
0.100	0.700	5.934	18.412	18.217
0.200	0.800	5.962	18.242	18.130
0.300	0.900	5.988	18.073	18.044
0.400	1.000	6.011	17.906	17.957
0.500	1.100	6.033	17.741	17.872
0.600	1.200	6.053	17.577	17.786
0.700	1.300	6.071	17.415	17.701
0.800	1.400	6.089	17.254	17.617
0.900	1.500	6.105	17.095	17.533
1.000	1.600	6.120	16.937	17.449
1.100	1.700	6.135	16.781	17.366

****

REGIONAL MODELING SYSTEM Ver 3.2 (OWRM - 9/90)
12-28-1990 12:41:39

DATA FILE = MARION.MOD

****

REGIONAL MODELING SYSTEM VERSION 3.2

DATA FILE SUMMARY

****

THE NAME OF THE DATA FILE IS: MARION.MOD

THE STREAM NAME IS: Middle Fork Holston River
THE RIVER BASIN IS: Tennessee-Big Sandy River
THE SECTION NUMBER IS: 5
THE CLASSIFICATION IS: IV

STANDARDS VIOLATED (Y/N) = N
STANDARDS APPROPRIATE (Y/N) = Y

DISCHARGE WITHIN 3 MILES (Y/N) = N

THE DISCHARGE BEING MODELED IS: Town of Marion WWTP

PROPOSED LIMITS ARE:
FLOW = 3.4 MGD
BOD5 = 25 MG/L
TKN = 20 MG/L
D.O. = 6 MG/L

THE NUMBER OF SEGMENTS TO BE MODELED = 2

7Q10 WILL BE CALCULATED BY: DRAINAGE AREA COMPARISON
THE GAUGE NAME IS: Middle Fork Holston River at Sevenmile Ford
GAUGE DRAINAGE AREA = 132 SQ.MI.
GAUGE 7Q10 = 17.1 MGD
DRAINAGE AREA AT DISCHARGE = 69.2 SQ.MI.

STREAM A DRY DITCH AT DISCHARGE (Y/N) = N
ANTIDEGRADATION APPLIES (Y/N) = N

ALLOCATION DESIGN TEMPERATURE = 26 °C

SEGMENT INFORMATION

####### SEGMENT # 1 #######

SEGMENT ENDS BECAUSE: A TRIBUTARY ENTERS AT END

SEGMENT LENGTH = .6 MI

SEGMENT WIDTH = 30 FT
SEGMENT DEPTH = 1.6 FT
SEGMENT VELOCITY = .4 FT/SEC

DRAINAGE AREA AT SEGMENT START = 69.2 SQ.MI.
DRAINAGE AREA AT SEGMENT END = 69.2 SQ.MI.

ELEVATION AT UPSTREAM END = 2059 FT
ELEVATION AT DOWNSTREAM END = 2049 FT

THE CROSS SECTION IS: WIDE SHALLOW ARC
THE CHANNEL IS: MODERATELY MEANDERING

POOLS AND RIFFLES (Y/N) = Y
THE SEGMENT LENGTH IS 50 % POOLS
POOL DEPTH = 2.4 FT
THE SEGMENT LENGTH IS 50 % RIFFLES
RIFFLE DEPTH = .8 FT

THE BOTTOM TYPE = LARGE ROCK
SLUDGE DEPOSITS = NONE
AQUATIC PLANTS = FEW
ALGAE OBSERVED = VISIBLE ONLY ON EDGES
WATER COLORED GREEN (Y/N) = N

TRIBUTARY DATA
FLOW = .87 MGD
BOD5 = 2 MG/L
TKN = 0 MG/L
D.O. = 6.8515 MG/L

SEGMENT INFORMATION

####### SEGMENT # 2 #######

SEGMENT ENDS BECAUSE: THE MODEL ENDS

SEGMENT LENGTH = 1.1 MI

SEGMENT WIDTH = 32 FT
SEGMENT DEPTH = 1.6 FT
SEGMENT VELOCITY = .4 FT/SEC

DRAINAGE AREA AT SEGMENT START = 69.2 SQ.MI.
DRAINAGE AREA AT SEGMENT END = 69.82 SQ.MI.

ELEVATION AT UPSTREAM END = 2049 FT
ELEVATION AT DOWNSTREAM END = 2022 FT

THE CROSS SECTION IS: WIDE SHALLOW ARC
THE CHANNEL IS: MODERATELY MEANDERING

POOLS AND RIFFLES (Y/N) = Y
THE SEGMENT LENGTH IS 50 % POOLS
POOL DEPTH = 2.4 FT
THE SEGMENT LENGTH IS 50 % RIFFLES
RIFFLE DEPTH = .8 FT

THE BOTTOM TYPE = LARGE ROCK
SLUDGE DEPOSITS = NONE
AQUATIC PLANTS = FEW
ALGAE OBSERVED = VISIBLE ONLY ON EDGES
WATER COLORED GREEN (Y/N) = N

****

REGIONAL MODELING SYSTEM Ver 3.2 (OWRM - 9/90)
12-28-1990 12:44:31

Spreadsheet for determination of WET test endpoints or WET limits

Excel 97
Revision Date: 01/10/05
File: WETLIM10.xls
(MIX.EXE required also)

Enter data in the cells with blue type:

Entry Date:	02/16/06	
Facility Name:		
VPDES Number:	VA0000000	
Outfall Number:	000	
Plant Flow:	3.4	MGD
Acute 1Q10:	9.3	MGD
Chronic 7Q10:	11.9	MGD

Are data available to calculate CV? (Y/N) N (Minimum of 10 data points, same species, needed) Go to Page 2
Are data available to calculate ACR? (Y/N) N (NOEC<LC50, do not use greater/less than data) Go to Page 3

IWC_a	26.77165354	%	Plant flow/plant flow + 1Q10
IWC_c	22.22222222	%	Plant flow/plant flow + 7Q10
Dilution, acute	3.735294118		100/IWCa
Dilution, chronic	4.5		100/IWCc
WLA_a	1.120588235		Instream criterion (0.3 TUa) X's Dilution, acute
WLA_c	4.5		Instream criterion (1.0 TUc) X's Dilution, chronic
$WLA_{a,c}$	11.20588235		ACR X's WLA_a - converts acute WLA to chronic units
ACR -acute/chronic ratio	10		LC50/NOEC (Default is 10 - if data are available, use tables Page 3)
CV-Coefficient of variation	0.6		Default of 0.6 - if data are available, use tables Page 2)
Constants eA	0.4109447		Default = 0.41
eB	0.6010373		Default = 0.60
eC	2.4334175		Default = 2.43
eD	2.4334175		Default = 2.43 (1 samp)

No. of sample 1

$LTA_{a,c}$	4.604997962	WLAa,c X's eA			
LTA_c	2.70466785	WLAc X's eB			
MDL** with $LTA_{a,c}$	11.20588263	TU_c	NOEC =	8.923884	(Protects from acute/chronic toxicity)
MDL** with LTA_c	6.581586078	TU_c	NOEC =	15.193906	(Protects from chronic toxicity)
AML with lowest LTA	6.581586078	TU_c	NOEC =	15.193906	Lowest LTA X's eD

IF ONLY ACUTE ENDPOINT/LIMIT IS NEEDED, CONVERT MDL FROM TU_c to TU_a

MDL with $LTA_{a,c}$	1.120588263	TU_a	LC50 =	89.238843	%
MDL with LTA_c	0.658158608	TU_a	LC50 =	151.939060	%

Acute Endpoint/Permit Limit — Use as LC_{50} in Special Condition, as TUa on DMR

ACUTE 100% = NOAEC LC_{50} = NA % Use as NA TUa

ACUTE WLAa 1.12058824 Note: Inform the permittee that if the mean of the data exceeds this TUa: 1.0 a limit may result using WLA.EXE

Chronic Endpoint/Permit Limit — Use as NOEC in Special Condition, as TUc on DMR

CHRONIC	6.581586078	TU_c	NOEC =	16	% Use as	6.25	TU_c
BOTH*	11.20588263	TU_c	NOEC =	9	% Use as	11.11	TU_c
AML	6.581586078	TU_c	NOEC =	16	% Use as	6.25	TU_c

ACUTE WLAa,c 11.2058824
CHRONIC WLAc 4.5
* Both means acute expressed as chronic

Note: Inform the permittee that if the mean of the data exceeds this TUc: 2.70466772 a limit may result using WLA.EXE

% Flow to be used from MIX.EXE

Difuser /modeling study?
Enter Y/N N
Acute 1 :1
Chronic 1 :1

NOTE: If the IWCa is >33%, specify the NOAEC = 100% test/endpoint for use

**The Maximum Daily Limit is calculated from the lowest LTA, X's eC. The LTAa,c and MDL using it are driven by the ACR.

Rounded NOEC's %
NOEC = 9 %
NOEC = 16 %
NOEC = 16

Use NOAEC=100%

Rounded LC50's %
LC50 = 90 %
LC50 = NA

Page 2 - Follow the directions to develop a site specific CV (coefficient of variation)

IF YOU HAVE AT LEAST 10 DATA POINTS THAT ARE QUANTIFIABLE (NOT "<" OR ">") FOR A SPECIES, ENTER THE DATA IN EITHER COLUMN "G" (VERTEBRATE) OR COLUMN "J" (INVERTEBRATE). THE 'CV' WILL BE PICKED UP FOR THE CALCULATIONS BELOW. THE DEFAULT VALUES FOR eA, eB, AND eC WILL CHANGE IF THE 'CV' IS ANYTHING OTHER THAN 0.6.

Coefficient of Variation for effluent tests

CV = 0.6 (Default 0.6)

δ^2 = 0.3074847

δ = 0.554513029

Using the log variance to develop eA

(P. 100, step 2a of TSD)

Z = 1.881 (97% probability stat from table

A = -0.88929666

eA = 0.410944686

Using the log variance to develop eB

(P. 100, step 2b of TSD)

δ_4^2 = 0.086177696

δ_4 = 0.293560379

B = -0.50909823

eB = 0.601037335

Using the log variance to develop eC

(P. 100, step 4a of TSD)

δ^2 = 0.3074847

δ = 0.554513029

C = 0.889296658

eC = 2.433417525

Using the log variance to develop eD

(P. 100, step 4b of TSD)

n = 1 This number will most likely stay as "1", for 1 sample/month.

δ_n^2 = 0.3074847

δ_n = 0.554513029

D = 0.889296658

eD = 2.433417525

	Vertebrate IC_{25} Data or LC_{50} Data	LN of data	Invertebrate IC_{25} Data or LC_{50} Data	LN of data
	**********		**********	
1	0		0	
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
St Dev	NEED DATA	NEED DATA	St Dev	NEED DATA NEED DATA
Mean	0	0	Mean	0 0
Variance	0	0.000000	Variance	0 0.000000
CV	0		CV	0

Page 3 - Follow directions to develop a site specific ACR (Acute to Chronic Ratio)

To determine Acute/Chronic Ratio (ACR), insert usable data below. Usable data is defined as valid paired test results, acute and chronic, tested at the same temperature, same species. The chronic NOEC must be less than the acute LC_{50}, since the ACR divides the LC_{50} by the NOEC. LC_{50}'s >100% should not be used.

Table 1. ACR using Vertebrate data

Set #	LC_{50}	NOEC	Test ACR	Logarithm	Geomean	Antilog	ACR to Use
1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
2	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
4	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
5	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
7	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
8	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
9	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
10	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA

ACR for vertebrate data: 0

Table 1. Result: Vertebrate ACR 0

Table 2. Result: Invertebrate ACR 0

Lowest ACR: Default to 10

Table 2. ACR using Invertebrate data

Set #	LC_{50}	NOEC	Test ACR	Logarithm	Geomean	Antilog	ACR to Use
1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
2	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
4	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
5	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
7	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
8	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
9	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
10	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA

ACR for vertebrate data: 0

DILUTION SERIES TO RECOMMEND

Table 4.

	Monitoring		Limit	
	% Effluent	TUc	% Effluent	TUc
Dilution series based on data mean	37.0	2.7046677		
Dilution series to use for limit			16	6.25
Dilution factor to recommend:	0.6080552		0.4	
Dilution series to recommend:	100.0	1.00	100.0	1.00
	60.8	1.64	40.0	2.50
	37.0	2.70	16.0	6.25
	22.5	4.45	6.4	15.63
	13.67	7.32	2.6	39.06
Extra dilutions if needed	8.31	12.03	1.0	97.66
	5.05	19.79	0.4	244.14

Convert LC_{50}'s and NOEC's to Chronic TU's

Table 3. for use in WLA.EXE ACR used: 10

	Enter LC_{50}	TUc	Enter NOEC	TUc
1		NO DATA		NO DATA
2		NO DATA		NO DATA
3		NO DATA		NO DATA
4		NO DATA		NO DATA
5		NO DATA		NO DATA
6		NO DATA		NO DATA
7		NO DATA		NO DATA
8		NO DATA		NO DATA
9		NO DATA		NO DATA
10		NO DATA		NO DATA
11		NO DATA		NO DATA
12		NO DATA		NO DATA
13		NO DATA		NO DATA
14		NO DATA		NO DATA
15		NO DATA		NO DATA
16		NO DATA		NO DATA
17		NO DATA		NO DATA
18		NO DATA		NO DATA
19		NO DATA		NO DATA
20		NO DATA		NO DATA

If WLA.EXE determines that an acute limit is needed, you need to convert the TUc answer you get to TUa and then an LC50, enter it here: NO DATA $\%LC_{50}$ NO DATA TUa

Cell: I9
Comment:
This is assuming that the data are Type 2 data (none of the data in the data set are censored - "<" or ">").

Cell: K18
Comment: This is assuming that the data are Type 2 data (none of the data in the data set are censored - "<" or ">").

Cell: J22
Comment: Remember to change the "N" to "Y" if you have ratios entered, otherwise, they won't be used in the calculations.

Cell: C40
Comment:
If you have entered data to calculate an ACR on page 3, and this is still defaulted to "10", make sure you have selected "Y" in cell E21

Cell: C41
Comment: If you have entered data to calculate an effluent specific CV on page 2, and this is still defaulted to "0.6", make sure you have selected "Y" in cell E20

Cell: L48
Comment:
See Row 151 for the appropriate dilution series to use for these NOEC's

Cell: G62
Comment:
Vertebrates are:
Pimephales promelas
Oncorhynchus mykiss
Cyprinodon variegatus

Cell: J62
Comment:
Invertebrates are:
Ceriodaphnia dubia
Mysidopsis bahia

Cell: C117
Comment: Vertebrates are:

Pimephales promelas
Cyprinodon variegatus

Cell: M119
Comment: The ACR has been picked up from cell C34 on Page 1. If you have paired data to calculate an ACR, enter it in the tables to the left, and make sure you have a "Y" in cell E21 on Page 1. Otherwise, the default of 10 will be used to convert your acute data.

Cell: M121
Comment: If you are only concerned with acute data, you can enter it in the NOEC column for conversion and the number calculated will be equivalent to the TUa. The calculation is the same: 100/NOEC = TUc or 100/LC50 = TUa.

Cell: C138
Comment: Invertebrates are:

Ceriodaphnia dubia
Mysidopsis bahia

Revised 2/2003

State "Transmittal Checklist" to Assist in Targeting Municipal and Industrial Individual NPDES Draft Permits for Review

Part I. State Draft Permit Submission Checklist

In accordance with the MOA established between the Commonwealth of Virginia and the United States Environmental Protection Agency, Region III, the Commonwealth submits the following draft National Pollutant Discharge Elimination System (NPDES) permit for Agency review and concurrence.

Facility Name: Town of Marion Wastewater Treatment Plant

NPDES Permit Number: VA0086304

Permit Writer Name: Fred M. Wyatt

Date: January 31, 2011

Major [X] **Minor** [ ] **Industrial** [ ] **Municipal** [X]

I.A. Draft Permit Package Submittal Includes:	**Yes**	**No**	**N/A**
1. Permit Application?	X		
2. Complete Draft Permit (for renewal or first time permit– entire permit, including boilerplate information)?	X		
3. Copy of Public Notice?		X	
4. Complete Fact Sheet?	X		
5. A Priority Pollutant Screening to determine parameters ofconcern?	X		
6. A Reasonable Potential analysis showing calculated WQBELs?	X		
7. Dissolved Oxygen calculations?		X	
8. Whole Effluent Toxicity Test summary and analysis?	X		
9. Permit Rating Sheet for new or modified industrial facilities?			X

I.B. Permit/Facility Characteristics	**Yes**	**No**	**N/A**
1. Is this a new, or currently unpermitted facility?		X	
2. Are all permissible outfalls (including combined sewer overflow points, non process water and storm water) from the facility properly identified and authorized in the permit?	X		
3. Does the fact sheet **or** permit contain a description of the wastewater treatment process?	X		

I.B. Permit/Facility Characteristics– cont.	Yes	No	N/A
4. Does the review of PCS/DMR data for at least he last 3 years indicate significant non-compliance with the existing permit?		X	
5. Has there been any change in streamflow characteristics since the last permit was developed?		X	
6. Does the permit allow the discharge of new or increased loadingsof any pollutants?		X	
7. Does the fact sheet **or** permit provide a description of the receiving water body(s) to which the facility discharges, including information on low/critical flow conditions and designated/existing uses?	X		
8. Does the facility discharge to a 303(d) listed water?	X		
a. Has a TMDL been developed and approved by EPA for the impaired water?	X		
b. Does the record indicate that the TMDL development is on the State priority list and will most likely be developed within the life of the permit?			X
c. Does the facility discharge a pollutant of concern identified in the TMDL or 303(d) listed water?	X		
9. Have any limits been removed, or are any limits less stringent, than those in the current permit?		X	
10. Does the permit authorize discharges of storm water?		X	
11. Has the facility substantially enlarged or altered its operation or substantially increased its flow or production?		X	
12. Are there any production-based, technology-based effluent limits in the permit?		X	
13. Do any water quality-based effluent limit calculations differ from the State's standard policies or procedures?		X	
14. Are any WQBELs based on an interpretation of narrative criteria?		X	
15. Does the permit incorporate any variances or other exceptions to the State's standards or regulations?		X	
16. Does the permit contain a compliance schedule for any limit or condition?		X	
17. Is there a potential impact to endangered/threatened species or their habitat by the facility's discharge(s)?	X		
18. Have impacts from the discharge(s) at downstream potable water supplies been evaluated?	X		
19. Is there any indication that there is significant public interest in the permit action proposed for this facility?		X	
20. Have previous permit, application, and fact sheet been examined?	X		

Part II. NPDES Draft Permit Checklist

Region III NPDES Permit Quality Checklist – for POTWs

(To be completed and included in the record only for POTWs)

II.A. Permit Cover Page/Administration	Yes	No	N/A
1. Does the fact sheet or permit describe the physical location of the facility, including latitude and longitude (not necessarily on permit cover page)?	X		
2. Does the permit contain specific authorization-to-discharge information (from where to where, by whom)?	X		

II.B. Effluent Limits– General Elements	Yes	No	N/A
1. Does the fact sheet describe the basis of final limits in the permit (e.g., that a comparison of technology and water quality-based limits was performed, and the most stringent limit selected)?	X		
2. Does the fact sheet discuss whether "antibacksliding" provisions were met for any limits that are less stringent than those in the previous NPDES permit?			X

II.C. Technology-Based Effluent Limits (POTWs)	Yes	No	N/A
1. Does the permit contain numeric limits for ALL of the following: BOD (or alternative, e.g., CBOD, COD, TOC), TSS, and pH?	X		
2. Does the permit require at least 85% removal for BOD (or BOD alternative) and TSS (or 65% for equivalent to secondary) consistent with 40 CFR Part 133?	X		
a. If no, does the record indicate that application of WQBELs, or some other means, results in more stringent requirements than 85% removal or that an exception consistent with 40 CFR 133.103 has been approved?			X
3. Are technology-based permit limits expressed in the appropriate units of measure (e.g., concentration, mass, SU)?	X		
4. Are permit limits for BOD and TSS expressed in terms of both long term (e.g., average monthly) and short term (e.g., average weekly) limits?	X		
5. Are any concentration limitations in the permit less stringent than the secondary treatment requirements (30 mg/l BOD5 and TSS for a 30-day average and 45 mg/l BOD5 and TSS for a 7-day average)?		X	
a. If yes, does the record provide a justification (e.g., waste stabilization pond, trickling filter, etc.) for the alternate limitations?			X

II.D. Water Quality-Based Effluent Limits	Yes	No	N/A
1. Does the permit include appropriate limitations consistent with 40 CFR 122.44(d) covering State narrative and numeric criteria for water quality?	X		
2. Does the fact sheet indicate that any WQBELs were derived from a completed and EPA approved TMDL?		X	

II.D. Water Quality-Based Effluent Limits – cont.	Yes	No	N/A
3. Does the fact sheet provide effluent characteristics for each outfall?	X		
4. Does the fact sheet document that a "reasonable potential" evaluation was performed?	X		
a. If yes, does the fact sheet indicate that the "reasonable potential" evaluation was performed in accordance with the State's approved procedures?	X		
b. Does the fact sheet describe the basis for allowing or disallowing in-stream dilution or a mixing zone?	X		
c. Does the fact sheet present WLA calculation procedures for all pollutants that were found to have "reasonable potential"?	X		
d. Does the fact sheet indicate that the "reasonable potential" and WLA calculations accounted for contributions from upstream sources (i.e., do calculations include ambient/background concentrations)?	X		
e. Does the permit contain numeric effluent limits for all pollutants for which "reasonable potential" was determined?	X		
5. Are all final WQBELs in the permit consistent with the justification and/or documentation provided in the fact sheet?	X		
6. For all final WQBELs, are BOTH long-term AND short-term effluent limits established?	X		
7. Are WQBELs expressed in the permit using appropriate units of measure (e.g., mass, concentration)?	X		
8. Does the record indicate that an "antidegradation" review was performed in accordance with the State's approved antidegradation policy?	X		

II.E. Monitoring and Reporting Requirements	Yes	No	N/A
1. Does the permit require at least annual monitoring for all limited parameters and other monitoring as required by State and Federal regulations?	X		
a. If no, does the fact sheet indicate that the facility applied for and was granted a monitoring waiver, AND, does the permit specifically incorporate this waiver?			
2. Does the permit identify the physical location where monitoring is to be performed for each outfall?	X		
3. Does the permit require at least annual influent monitoring for BOD (or BOD alternative) and TSS to assess compliance with applicable percent removal requirements?		X	
4. Does the permit require testing for Whole Effluent Toxicity?	X		

II.F. Special Conditions	Yes	No	N/A
1. Does the permit include appropriate biosolids use/disposal requirements?	X		
2. Does the permit include appropriate storm water program requirements?			X

II.F. Special Conditions – cont.	Yes	No	N/A
3. If the permit contains compliance schedule(s), are they consistent with statutory and regulatory deadlines and requirements?			X
4. Are other special conditions (e.g., ambient sampling, mixing studies, TIE/TRE, BMPs, special studies) consistent with CWA and NPDES regulations?	X		
5. Does the permit allow/authorize discharge of sanitary sewage from points other than the POTW outfall(s) or CSO outfalls [i.e., Sanitary Sewer Overflows (SSOs) or treatment plant bypasses]?		X	
6. Does the permit authorize discharges from Combined Sewer Overflows (CSOs)?		X	
a. Does the permit require implementation of the "Nine Minimum Controls"?			X
b. Does the permit require development and implementation of a "Long Term Control Plan"?			X
c. Does the permit require monitoring and reporting for CSO events?			X
7. Does the permit include appropriate Pretreatment Program requirements?	X		

II.G. Standard Conditions	Yes	No	N/A
1. Does the **permit** contain all 40 CFR 122.41 standard conditions or the State equivalent (or more stringent) conditions?	X		

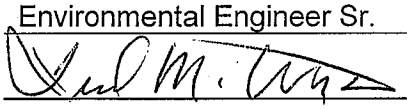
List of Standard Conditions – 40 CFR 122.41

Duty to comply
Duty to reapply
Need to halt or reduce activity not a defense
Duty to mitigate
Proper O & M
Permit actions
Property rights
Duty to provide information
Inspections and entry
Monitoring and records
Signatory requirement
Bypass
Upset
Reporting Requirements
Planned change
Anticipated noncompliance
Transfers
Monitoring reports
Compliance schedules
24-Hour reporting
Other non-compliance

2. Does the permit contain the additional standard condition (or the State equivalent or more stringent conditions) for POTWs regarding notification of new introduction of pollutants and new industrial users [40 CFR 122.42(b)]?	X		

Part III. Signature Page

Based on a review of the data and other information submitted by the permit applicant, and the draft permit and other administrative records generated by the Department/Division and/or made available to the Department/Division, the information provided on this checklist is accurate and complete, to the best of my knowledge.

Name	Fred M. Wyatt
Title	Environmental Engineer Sr.
Signature	
Date	01/31/2011